2003

Looking forward to fitness: The effects of time perception on exercise behaviour

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Looking Forward to Fitness: The Effects of Time Perception on Exercise Behaviour

by

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Bachelor of Arts (Honours), Wilfrid Laurier University, 2002

THESIS

Submitted to the Department of Psychology

in partial fulfillment of the requirements for

Master of Arts

Wilfrid Laurier University

2003

Abstract

Previous research has shown that people induced with a future-oriented time perspective were more likely to adhere to an exercise program because they were focused on the benefits of exercise and therefore better able to overcome short-term (ST) costs. The current research aimed to extend these findings by examining time perception—how close or distant the future benefits of exercise subjectively feel. Three studies examined participants' perceptions of the ST and long-term (LT) benefits of exercise on their motivation to be physically active and their subsequent exercise behaviour. Study 1 found that having a future time perspective was related to higher physical fitness, and that focusing on ST benefits was related to greater levels of exercise. In Study 2, participants were induced to feel either close to, or distant from, LT benefits of exercise. We then examined participants' rankings of ST and LT benefits. It was hypothesized that people induced to feel close to the LT benefits of exercise would rank them as more important, but the effect was non-significant. Study 3 was a 4-week longitudinal study wherein participants used Palm Pilots to receive a daily time perception manipulation and then recorded a daily log of their exercise. Participants were experimentally induced to feel subjectively close to, or distant from, the benefits of exercise experienced after 6 weeks of activity. The manipulation was generally successful at altering time perception, but there was little evidence that people who were induced to feel close to the fitness goals exercised significantly more than people induced to feel distant from the goals. Possible interpretations of the null effects are discussed, along with suggestions for future research.

Acknowledgements

First and foremost, I would like to thank my advisor, Anne Wilson. I was ecstatic to be given the opportunity to work under her supervision and I was honoured to be working with such a competent and respected researcher. Anne contributed more than her own knowledge and brilliance to this project—she helped me to develop my own research and writing skills and allowed me freedom and independence to try new challenges, along with guidance to help me to correct my mistakes and to improve. Her confidence in my abilities never faltered, even when I lacked faith in myself. Anne's commitment and dedication to this project was inspiring and I cannot thank her enough for being such an awesome advisor in so many ways.

My gratitude is extended to the members of my thesis committee, Roger Buehler, Mike Pratt, and Anne Wilson for their guidance and thought-provoking suggestions. I appreciate their time and expertise that they dedicated to my thesis, even when they had countless other responsibilities on their plates.

I also thank Anne Wilson, Roger Buehler, Bruce Arai and Juanne Clarke for their sound advice as well as the time they devoted to writing letters of reference for PhD and scholarship applications.

I would like to recognize Travis McTeer for hours of technical support and Catherine McKay who helped with data entry.

Many thanks to my parents, Mary Lynn and Murray McLellan, for being unconditionally supportive throughout my academic career and for helping me keep things in perspective. Finally, thanks to my amazing friends Adèle, Jenny, Travis, Ange,

Hena, Evelina, and Steve for their help and understanding through tough times and for a ton of great memories.

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Regular physical activity is fundamental to our physical health, and exercising has a host of benefits associated with it. Some of these benefits include: reduced stress, increased energy, better flexibility, reduced risk of chronic illness, feeling better about one's self, and living longer (Health Canada, n.d., para. 2). There are also, of course, costs associated with exercising. Some of the immediate costs of engaging in physical activity may include: spending time, forsaking other pleasurable activities, feeling embarrassed, and experiencing physical discomfort. Given these immediate costs that people must consistently overcome to remain physically active, it may come as no surprise that the majority of Canadians (55%) are not getting enough exercise to reap health benefits (Canadian Fitness and Lifestyle Research Institute, n.d., para. 1). One explanation for this is because the short-term (ST) costs of being physically active loom larger (i.e., carry more weight) than the long-term (LT) benefits associated with exercise (Hall & Fong, 2001). That is, maybe people are less likely to base their decisions to exercise on the LT benefits they will reap, and less likely to exercise because they are focusing their attention on the ST costs. The present research addresses this potential hurdle to exercising, and suggests a way that people who focus on ST costs of exercising might overcome this barrier and exercise more frequently.

As with any decision, the choice to exercise involves, to some degree, an assessment of costs and benefits. How people weigh ST and LT costs and benefits of some behaviours can be affected by their time perspectives. Time perspective (TP) is an individual difference variable representing how one constructs psychological time. Human experience can be cognitively divided into past, present, or future temporal frames (Zimbardo & Boyd, 1999). 'Present-Oriented' people tend to rely on the salient

features of the immediate situation when making decisions about how to act. 'Future-Oriented' individuals, on the other hand, base their decisions on the anticipated outcome of a situation. People with a future TP are less likely to engage in risky health behaviours than people with a present TP (Hall & Fong, 1997; Keough, Zimbardo, & Boyd, 1999; Zimbardo, Keough, & Boyd, 1997). For example, future TP was negatively related to risky driving and substance abuse (e.g., tobacco, alcohol, and drugs) whereas present TP was positively related to these behaviours, even when controlling for personality traits that are associated with them. The authors theorized that present-oriented people often do not worry about future outcomes, and their actions are not deterred by warnings that negative consequences may occur in the future. People with a future TP are better able to restrain themselves from engaging in tempting behaviours (e.g., driving fast, smoking, drinking) because of their abilities to clearly articulate the consequences of their actions (Keough, Zimbardo, & Boyd, 1999). Behaviours that are risky to one's health and safety may be somewhat desirable to most people in the short-term, but people with a future TP are better able to consider the negative consequences of these risky actions. However, the research that demonstrated these findings was correlational in nature, and therefore one cannot conclude that having a future TP *causes* someone to engage in health-protective behaviours.

There is evidence, however, that having a future TP causes one to engage in healthy behaviours. In an experimental study of time perspective, Hall and Fong (2001) induced some participants to have a future-oriented TP and investigated its causal effect on attendance at group fitness classes. In a time perspective intervention, the researchers conducted three 30-minute weekly classroom sessions designed to help participants become more aware of the LT favourable implications of their decisions to exercise. The

sessions included education and activities to help participants become more aware of the LT effects of exercise, and to help them keep these cognitions active when participating in, or deciding to engage in, physical activity. The TP intervention did more than highlight the LT benefits of exercise to participants—it helped build psychological connections between present behaviour and LT positive outcomes. This intervention was designed to induce a future TP in participants through activities such as making lists of the ST costs and LT gains of exercise, thus making participants more sensitized to the fact that the LT gains far outweigh the ST costs. In this study, the researchers included a second intervention condition—a goal-setting intervention group that also consisted of three 30-minute weekly classroom sessions. The goal-setting intervention included all of the same information as the time perspective intervention, minus the activities designed to induce a future TP. Results of the study indicated that participants who received a future TP intervention engaged in a significantly greater amount of vigorous physical activity than both the goal-setting intervention condition and the control (no treatment) condition. The results of this study supported the premise that having a future TP can be an effective way—even more so than goal-setting—to help people achieve health-related goals that have ST costs and LT gains. It is also congruent with previous findings that ST costs and benefits often loom larger than LT costs and benefits (Loewenstein & Elster, 1992). By focusing on the future—that is, having a future TP—the ST costs do not loom as large, and people are more likely to exercise (Hall & Fong, 2001). It is reasonable to believe that the TP intervention allowed participants in these studies to surpass the mental barrier of ST costs of exercising and instead increase the perceived significance of the longer-term benefits. That is, perhaps having a future TP helped to decrease the relative importance and salience of ST costs. This was not, however, explicitly measured by Hall

and Fong (2001) as the process through which people decided to exercise. In the present research, this potential mediating variable was assessed.

Time perception. The research to date on the construction of time in relation to people's subsequent health-related behaviours has focused on future TP—the degree to which one considers the future consequences of his or her actions (Hall & Fong, 1997, 1999; Strathman, Gleicher, Boninger, & Edwards, 1994). A different way to conceptualize the construction of time is time *perception*—how close or distant a point in time subjectively *feels* to an individual. The concept of perceived temporal distance (PTD) stems from the theory of temporal self-appraisal (Ross & Wilson, 2000; Wilson & Ross, 2001; Ross & Wilson, 2002). Perceived temporal distance—or time perception—is affected by a number of factors, including the passage of real time—yesterday will generally feel closer than last week or last month. However, time perception can be affected by cognitive and motivational factors as well. For example, it was found that people who ruminated (repeatedly thought) about a past negative event felt like the event was subjectively closer to the present than people who were distracted from thinking about it (McLellan, 2002), and this demonstrates the impact of a cognitive mechanism—rehearsal—on perceived time. In another study, students reported feeling temporally closer to past successes than to past failures (Ross & Wilson, 2002) and this is an example of a motivational mechanism—self-enhancement.

Temporal Self-Appraisal Theory suggests that past selves that feel temporally close are included in one's present identity, whereas "distant" past selves do not directly impact one's current self concept. Subjective distance from past events can occur naturally, but perceived time of past events has also been systematically manipulated in previous research. In a study by Wilson and Ross (2001), participants were induced to

feel as though a past experience was temporally recent or distant and this had a temporary effect on participants' self-concepts. Feeling subjectively close to past successes and far from failures led to more favourable present self-views, and feeling close to failures and far from successes led to more negative self-view (Wilson & Ross, 2001).

Just as past events can naturally feel subjectively close or distant, events in the future can also be perceived as temporally close or distant. One point in time in the future may feel like tomorrow and another may feel very remote, even though both events will occur at a similar point in objective (calendar) time. People can also be experimentally induced to feel temporally close to or distant from a *future* point in time, just as their time perception of past events can be manipulated. Previous researchers have successfully manipulated participants' perceptions of how close an event in the future feels (Lawford, Wilson, & Buehler, 2002; Schmidt, 2003). That is, they made future events appear subjectively close or distant to the participants by creating a subtle illusion. This was accomplished by having participants indicate on a continuous time-line where a particular point in time in the future is. At the left-most side of the line was "today" and the right end of the scale there was either "graduation" which was four years from the present time (future-close condition) or "end of term" in three months (future-far condition). In both conditions, participants were asked to place the target future time (i.e., two months from now) on the line. In the future-close condition, the participants drew a line spatially closer to "today" because the time-line encompassed a longer period. In contrast, the point would be spatially farther from "today" in the future-far condition because the time line spanned only a few months (see Figure 1). The time-line creates the subtle illusion that a future point in time is near or far. Lawford and colleagues (2002) manipulated time perception of future selves and found that people tend to enhance subjectively close

future selves more than distant future selves, which is consistent with Temporal Self-Appraisal Theory and motivation to maintain a positive current self-image.

In this previous research, time perception was altered to examine its effect on students' predictions about future attributes. It focused on the identity implication of subjectively near or distant selves. The current research, on the other hand, examined another possible implication of time perception. Specifically, we proposed that time perception will affect motivation and behaviour because LT benefits are psychologically more salient when they feel close. Perceived time can affect more than people's self-appraisals—some research has also indicated that there is a connection between time perception and people's motivation and future behaviour intentions. A study examining tendency to procrastinate and subjective distance found that procrastinators tend to view future events as temporally more distant than non-procrastinators (Wilson, 2002). A logical conclusion to this finding (though it was not explicitly tested) is that procrastinators feel they have lots of time to get things done and hence are less motivated to get anything done in the present. In another study, participants were induced to feel close to or distant from their university graduation. People induced to feel close to graduation reported greater motivation to work toward a successful graduation (Strahan & Wilson, in press). These studies demonstrated that the role of time perception goes beyond mental representations of self and extends to one's actual motivation and (potentially) behaviour in the future.

The present studies examined participants' psychological experience of time, and its effects on attitudes, motivation, and behaviour relating to exercise. However, instead of manipulating their time *perspective* as Hall and Fong (2001) did, the current study manipulated time *perception*. The constructs of time perspective and time perception are

conceptually similar (i.e., they both refer to the psychological construction of time). But time perspective is an individual variable that refers to a person's general tendency to focus on the past, present and future, and the degree to which they consider the consequences of their actions for the future. In contrast, time perception is more malleable and refers to how temporally close or distant a specific event feels. We propose a distinction between these two constructs in the ways they affect motivation and behaviour. In order to achieve favourable outcomes in the LT future, one must often first overcome ST obstacles. Focusing on a goal in the future—that is, having a future time *perspective*—may make someone more likely to achieve that goal because the goal importance becomes salient, and people are able to make direct connections between their present behaviour and LT outcomes. This might make people more motivated to achieve a LT outcome, even in the face of ST challenges. Manipulating time perception may influence motivation over and above future TP. Making a LT future goal feel temporally close may be sufficient to focus one's attention on it and make it cognitively salient because it feels like it will take place in the close future, even for someone without a future TP. As a result, people may be more apt to surpass the ST benefits to achieve the LT goals, because the LT goals feel like they will occur in the ST.

Consider construal level theory (CLT) as a possible theoretical basis for the hypothesis that a close time perception will have a positive effect on exercise behaviour. This theory proposes that (real) temporal distance affects the level of abstraction when thinking of events in the future. Events in the distant future are construed abstractly and schematically and events in the near future are construed as concrete and tangible (Liberman, Sagristano, & Trope, 2002). Consistent with CLT, having a close time perception of a future goal (i.e., just *feeling* that the positive outcome is temporally close)

may also make one more likely to achieve a goal by making it feel more concrete or "real". When the favourable outcome (e.g., of regular exercise) feels real and tangible, people may focus on the factors to make goal attainment feasible and they may be more motivated to achieve their goals.

We hypothesized that inducing participants to feel temporally close to a future point in time would cause them to rate LT benefits of exercising more favourably, and increase their motivation to achieve them. Increased motivation would then lead them to increase their levels of physical activity. Hall and Fong (2001) found that inducing a future TP in participants increased their levels of physical activity because they were focusing on the benefits they would achieve in the distant future. The current research investigated an alternative interpretation of LT goal focus. Simply inducing participants to feel temporally close to the LT outcomes may be enough to keep them focused on them, and thus motivate them to exercise.

For the current research program, we used the same type of time perception manipulation (a subjective time-line) as used by Lawford and colleagues (2002) for Studies 2 and 3, and examined its effects on perceived importance of ST and LT benefits of exercise, motivation and intention to exercise, and exercise behaviour. This research program was built on the premise that future outcomes that feel temporally close will exert more influence on people's attitudes and behaviours than outcomes that feel distant, because the outcomes are more cognitively salient. Three studies looked at the relation between people's perceptions of time and subsequent attitudes and motivation toward exercise, and exercise behaviour.

Study 1 was a questionnaire study that correlationally examined participants' perceptions of how close the future subjectively feels, and how they ranked ST and LT

benefits of exercise, in order of importance to them. People's time perception was also examined in relation to their current physical activity and self-reported physical fitness.

Study 2 was an experimental study that was conducted in the laboratory. Participants were induced to feel either close to or distant from a future point in time (30 years old) using a subjective time-line with different end-points, which is described in more detail below. After the time-line manipulation they completed a questionnaire assessing their perceived importance of ST and LT benefits of exercise, their motivation to exercise, and their intentions to exercise. We hypothesized that participants who were induced to feel temporally close would rank the LT benefits of exercise as more important than participants who were induced to feel temporally distant from 30 years old. We predicted this result because by making the future feel temporally close, the LT benefits from exercise that one will reap would be made more cognitively salient, and pertinent to the present. Therefore, participants who were induced to feel temporally close to the LT benefits of exercising were expected to assign more importance to these benefits than people who were induced to feel distant from them.

Whereas Study 2 looked at the effects of time perception on people's attitudes, motivation and intentions, Study 3 looked at the influence of time perception on participants' actual behaviours. In the study, participants' exercise behaviours were monitored over a period of four weeks and students completed the dependent measures on personal Palm Pilots (electronic data organizers) that they kept with them for the duration of the study. The purpose of Study 3 was to examine the effect of one cognitive factor—perceived time—on participants' motivation to exercise, and their subsequent exercise behaviour. We predicted that people who felt temporally close to their fitness goals (which were attainable by the end of 6 weeks) would put more weight into LT goals than

into ST costs in their decision to exercise, report more motivation to exercise, and therefore engage in greater levels of exercise behaviour than people who were induced to feel distant from their fitness goals.

Study 1

The purpose of the questionnaire in Study 1 was to assess the relation between people's physical fitness, their motivations for exercise, and their naturally occurring time perceptions of the future. In addition, this study assessed people's interest and eligibility (physical suitability) for participating in Study 3. It was hypothesized that people who report that the future feels close would also report greater motivation, higher levels of exercise behaviour, and higher levels of physical fitness. We also examined how people rank the ST and LT benefits of exercise, and the effect of this factor in relation to exercise, motivation and fitness. We hypothesized that ST benefits would generally be more motivating for participants because they are temporally closer.

Method

Participants

In November 2002, 939 introductory psychology students at Wilfrid Laurier University participated in a mass testing session for course credit, which included the current brief questionnaire that was identical for all participants (see Appendix A). Eighty-seven participants were excluded from the analyses because they did not rank the benefits properly or they omitted responses. The final sample included 853 participants (586 females, 266 males, and 1 unidentifed) who participated for course credit.

Materials and Procedure

The questionnaire began with a Physical Activity Readiness Questionnaire (PAR-Q). This is a standard survey used for determining people's readiness for exercise; if the

respondent answers "yes" to one or more of the questions, it is recommended that he or she not start an exercise program before consulting a physician. This measure helps determine who is eligible for Study 3, as participants were invited by telephone to participate in Study 3 if they were interested and eligible. An exercise behaviour inventory assessed the participants' current levels of physical activity and the type of physical activity performed. Getting a measure of the students' current exercise habits provided a baseline comparison for their exercise habits before beginning participation in the follow-up study (Study 3). It also helped to select participants who had very low levels of activity and therefore would be most apt to achieve the benefits associated with regular exercise outlined in Study 3. The next set of questions assessed individual differences in reasons for exercising. Participants were asked to rank, in order of importance to them, five ST benefits of exercise and five relatively LT benefits, and this variable was assessed in terms of how it related to motivation, exercise, and fitness. Next, participants rated their perceived current fitness and their expected fitness levels one year from the present, on a scale of one to ten. Finally, participants were asked to indicate how far one year from the present subjectively felt to them as measure of general time perception of the future. The questionnaire was placed in random order with several other questionnaires at the mass testing session in which introductory psychology students had the option of participating for course credit. As part of a questionnaire for another study, participants also completed the Rosenberg Self-Esteem Scale (SE) (Rosenberg, 1965) and a measure of optimism: the LOT-R (Scheier, Carver, & Bridges, 1994), and these data were merged with the data of the current study by matching participants' responses with unique identification numbers. Participants completed the questionnaires at their own pace.

A median split was conducted on the measure of how far one year feels to create one time perception variable with two levels: those who felt like the future was close, and those who felt like the future was far. We predicted that those who perceived the future as subjectively close would be more motivated because their goals seem attainable in the near future. Participants' top-ranked benefits were also examined; participants were divided into two groups based on whether their top-ranked benefit was a ST benefit or a LT benefit[1]. It may be that people who perceived a ST benefit such as increased energy as most important would report more motivation to exercise because it is easier to keep a ST goal in focus than a LT goal. Although many people may have LT fitness goals such as decreased risk of acquiring cardiovascular disease, it may be more difficult to stay focused on them when they seem quite far in the future, and they may therefore be less motivated to exercise. It was hypothesized that those who perceive the future as close would report greater motivation, more exercise, and higher fitness levels than those who perceive the future as far. Also it was hypothesized that those who rank a ST benefit as most important would report more exercise and higher fitness levels than those who rank a LT benefit as most important. We also predicted an interaction between time perception and top-ranked benefit. For people who rank a ST benefit as most important, their motivation and exercise may not be affected by whether the future feels close or far because they are motivated by something in the near future. However, for people who rank a LT benefit as most important, motivation and exercise may be higher when they feel close to the future than when they feel far; the LT benefit will not be salient or motivating unless it feels as though it can be attained in the near future.

Results and Discussion

An ANOVA with the variables gender, time perception (future-close or future-far), and top-ranked benefit (ST or LT) was conducted for each of the three main dependent variables: reported exercise, current fitness, and expected fitness improvement.

Exercise. A total exercise score was created by aggregating participants' reports of the hours spent doing vigorous and moderate exercise over the past four weeks. The ANOVA revealed a main effect of gender, such that males reported more exercise (M = 17.26, SD = 20.42) than females (M = 13.84, SD = 14.39), $F(1, 842) = 5.74$, $p < .02$. There was also a main effect of top ranked benefit such that people who ranked a ST benefit as most important exercised more (M = 16.17, SD = 18.42) than those who ranked an LT benefit as most important (M = 13.24, SD = 13.61), $F(1, 842) = 4.28$, $p < .04$[2]. A median split was conducted on how far one year subjectively feels, to create two levels of the time perception variable[3]. ANOVAs revealed no main effect of time perception and there were no interactions, $Fs < 1$.

Another ANOVA was conducted to include median splits of SE and optimism testing for moderating effects of these two variables. There was a significant SE by feel-future interaction, indicating that SE moderated the effects of time perception on exercise behaviour, $F(1, 802) = 4.30$, $p < .04$. Those who felt close to the future and reported high SE exercised more (M = 18.84, SD = 25.69) than those who felt close to the future and reported low SE (M = 10.48, SD = 23.25), $F(1, 802) = 12.79$, $p < .001$. There was no significant difference between people with high or low SE when they felt distant from the future, $F(1, 802) = 1.29$, $p = .25$. There were no other significant interactions, $Fs < 1.67$, $ps > .20$.

The finding that participants who ranked a ST benefit as most important reported greater levels of exercise may be indicating that people with longer-term goals may be insufficiently motivated by these goals because the LT goals are less tangible and salient than ST goals. It is important to note that 43% of participants reported a LT goal to be most important to them. Although these goals are important to many people, they may seem too far in the distant future to motivate people to exercise. However, this finding is correlational and could be interpreted in the opposite direction (that exercising leads people to focus on ST benefits) or a third variable could be associated with both ST goal focus and exercise.

Self-esteem appears to moderate the relation between time perception on exercise behaviour. For people with higher SE, feeling like the future is subjectively close is associated with greater levels of exercise. Perhaps feeling like the future is close is motivating for people with high SE because they are optimistic about seeing improvement in their fitness levels in the (perceived close) future. On the contrary, perhaps people with lower SE might be less motivated to exercise when the future feels close because they are less optimistic about the likelihood of achieving fitness improvement in the (perceived close) future. Because this finding is correlational, we cannot determine causal effects of SE on exercise behaviour or whether the moderating effects of SE on exercise are the result of a separate third variable, and therefore this interpretation is speculative.

Current Fitness. An ANOVA revealed a main effect of gender on participants' current fitness ratings, such that males rated themselves as more fit ($M = 6.69$, $SD = 1.78$) than did females ($M = 5.68$, $SD = 1.90$), $F(1, 842) = 42.64$, $p < .001$. There was a main effect of how far the future feels, such that people who feel like the future is close report

higher fitness ($M = 6.33$, $SD = 1.77$) than people who feel like the future is far ($M = 5.81$, $SD = 1.98$), $F(1, 842) = 10.35$, $p = .001$. There was also a main effect of top ranked benefit, such that people who ranked a ST benefit as most important reported higher fitness ($M = 6.27$, $SD = 1.84$) than those who ranked a LT benefit as most important ($M = 5.64$, $SD = 1.97$), $F(1, 842) = 10.46$, $p = .001$. There were no significant interactions, $F < 1.17$, $ps > .28$. Another ANOVA was conducted to include median splits of SE and optimism testing for moderating effects of these two variables. There were no significant interactions with gender, time perception, or top-ranked benefit, indicating that optimism and SE did not moderate the effects of the IVs on current fitness reports, $Fs < 1.79$, $ps > .18$.

Participants who perceive the future as close reported that they have better physical fitness than do people who perceive the future as far. This suggests that feeling close to future favourable outcomes might be a factor that encourages healthful behaviours such as exercise, which lead to better fitness. The finding that participants who ranked a ST benefit as most important reported higher physical fitness may indicate that those who are focused on a ST (rather than LT) fitness goal are better able to keep it salient and exercise more, leading to better fitness.

Current and Expected Fitness. An ANCOVA was conducted to examine participants' expected fitness in one year, controlling for their current reported fitness. There were no main effects or interactions on participants' expected fitness, $Fs < 2.25$, $ps > .13$. Next, a repeated-measures ANOVA with 2 levels was conducted to examine differences between current fitness and expected fitness. There was a main effect of time such that people overwhelmingly expected that they would be more fit one year from now ($M = 7.33$, $SD = 1.59$) than they are today ($M = 6.00$, $SD = 1.92$), $F(1, 841) = 586.68$, $p <$

.001. There was a significant time by gender interaction; females reported greater expected improvement from current fitness ($M = 5.68$, $SD = 1.90$) and expected fitness ($M = 7.11$, $SD = 1.56$) than males ($M = 6.69$, $SD = 1.78$ vs. $M = 7.80$, $SD = 1.56$), $F(1, 841) = 8.25$, $p < .01$. There was a significant time by time perception interaction such that those who felt like the future was far reported greater expected improvement from current fitness ($M = 5.81$, $SD = 1.98$) to expected fitness ($M = 7.24$, $SD = 1.59$) than those who felt like the future was close ($M = 6.32$, $SD = 1.77$ vs. $M = 7.48$, $SD = 1.58$), $F(1, 841) = 6.99$, $p < .01$. The time by top-ranked benefit interaction was significant, such that people who reported a LT benefit as most important expected to have more improvement from current fitness ($M = 5.64$, $SD = 1.97$) to expected fitness ($M = 7.19$, $SD = 1.63$), than those who reported a ST benefit as most important, ($M = 6.27$, $SD = 1.84$ vs. $M = 7.43$, $SD = 1.56$), $F(1, 841) = 9.26$, $p < .01$.

There was a robust finding such that people expected to be more fit in the future than they are now. In fact, only 3% of participants (28) reported that they expected to be less fit one year from now than they are currently. This seems to demonstrate people's beliefs that they will improve over time. The rest of the findings of the repeated measures ANOVA should be interpreted with caution. The interaction effects of gender, time perception, and top-ranked benefit appear to be attributable to mean differences in ratings of present self. Means for future self were approximately equal across all conditions. Hence, the finding that some people expect less improvement in their fitness in one year appears to be a consequence of the fact that their initial fitness scores are higher rather than their expected fitness scores being lower.

We had predicted an interaction of time perception and top-ranked benefit on the dependent variables, such that people who ranked a LT benefit highest would report

greater exercise and fitness when the future felt close rather than far. There was no evidence of this interaction for any of the dependent variables. However, time perception and benefit ratings were somewhat related to fitness and exercise on their own.

Correlations. A LT benefit score was created by summing rankings of LT benefits. The ST benefit score was created by summing rankings of ST benefits. Lower scores indicate ranking those benefits as more important. There was a significant correlation between optimism and SE, $r(835) = .56, p < .001$. Pearson partial correlations were conducted to test the relations between SE and the variables of ST benefit ranking, LT benefit ranking, exercise, current fitness, expected fitness in one year, and how far one year feels, controlling for optimism. Correlations indicated that people who scored high on SE also tended to rank LT benefits as less important, $r(829) = .08, p < .02$, exercised more, $r(829) = .11, p < .01$, reported better current fitness, $r(829) = .16, p < .001$, and expected greater fitness improvement in one year, $r(829) = .15, p < .001$. There were no significant relations between SE and ST benefit ranking, and SE and how far one year feels, when controlling for optimism, $rs < .04$, $ps > .32$.

Pearson partial correlations were conducted to test the relations between optimism and the variables of ST benefit ranking, LT benefit ranking, exercise, current fitness, expected fitness in one year, and how far one year feels, controlling for SE. Correlations indicated that people who scored high on optimism also tended to rank ST benefits as more important, $r(829) = -.09, p < .01$. There were no significant relations between optimism and the variables LT benefit ranking, exercise, current fitness, expected fitness, and how far one year feels, controlling for SE, $rs < .06$, $ps > .07$.

Based on the results of the correlations, it appears that people with high SE also tend to exercise more and report better fitness than those with low SE. This relation is

probably bi-directional, such that having high SE leads people to engage in health-promoting behaviour, but exercising and being fit also leads people to have higher SE. It is worth noting that SE was a significant predictor of expected fitness in one year, but optimism was not. One might have predicted that being optimistic leads one to expect more improvement in their fitness level in the future, but this does not seem to be the case, at least when controlling for SE. However SE is a significant predictor of expected fitness, perhaps because people high in SE have more confidence that they can achieve their fitness goals.

Results of Study 1 indicate that focusing on ST outcomes and feeling subjectively closer to the future in general (one year) are associated with higher levels of exercise and fitness. It could be that benefits that are expected to occur in the near future are more motivating because they feel more tangible and attainable. In Study 1, we measured people's natural tendencies to feel close to or distant from the future. In Study 2, we attempted to manipulate people's time perception, inducing them to feel close or distant from the future (30 years old). Perhaps feeling subjectively close to the LT future benefits of exercise will have a causal effect on how much people value these benefits and deem them important reasons for exercising. When longer-term benefits are induced to feel subjectively closer, they may be rated as more important because they feel more salient and tangible.

Study 2

Study 2 examined the causal effects of perceived time on a number of factors including motivation to exercise, intention to exercise, and ratings of the benefits of exercising. We proposed that subjective time perception would be an important cognitive determinant of the degree to which individuals value ST and LT benefits of health

behaviours. Specifically, if people can be induced to feel psychologically close to the LT benefits of exercise, they should rank these LT benefits as more important to them. This hypothesis is based on the premise that these outcomes will become more salient and tangible when participants are induced to feel psychologically close to them.

Time perspective (TP) was also measured in Study 2 using Zimbardo's Time Perspective Inventory (Zimbardo & Boyd, 1999)[4]. The three factors that were assessed were Present-Hedonistic (P-H) TP, Present-Fatalistic (P-F) TP and future TP. The factor P-H (alpha = .79) reflects a risk-taking attitude with little concern for future consequences and includes such items as "Taking risks keeps my life from becoming boring," and "I do things impulsively." The P-F factor (alpha = .74) represents a fatalistic and helpless attitude toward the future, and includes the items "My life path is controlled by forces I cannot influence," and "Often luck pays off better than hard work." Future TP (alpha = .77) reflects a general orientation towards the future and concern for future outcomes. Future TP items include, "I am able to resist temptations when I know that there is work to be done," and "I complete projects on time by making steady progress." We looked at these three factors to examine their relations to exercise, motivation, and intention to exercise. We predicted a main effect of future TP, such that those who are high on this factor would also report greater levels of exercise, as this is consistent with past research (Hall & Fong, 2001). An interaction effect was also hypothesized, such that the future-close time perception manipulation would not affect people who already had a future TP. That is, people with a future TP are already focused on the LT benefits of exercise, and therefore feeling subjectively closer to these benefits may not make these benefits feel more salient and tangible.

Method

Participants

Seventy-eight introductory psychology students at Wilfrid Laurier University participated for course credit. Five participants were excluded from the analyses because they did not rank the benefits properly or they omitted responses. The final sample included 73 participants (57 females, 15 males, and 1 unidentifed).

Materials and Procedure

Participants were randomly assigned to one of three conditions: two experimental conditions (future-close or future-far) and a control (no manipulation) condition. They completed demographic questions including their age, gender, and year in university (see Appendix B). They were then asked to read a passage about health benefits, related to being active from now up to their early 30s. Participants in the 2 experimental conditions indicated where 30 years old is for them on the time-line. In the future-close condition, the endpoints of the time-line were "today" and "65 years old" and in the future-far condition, the endpoints were "today" and "35 years old". This was the future time perception manipulation, intended to induce people to feel close to or distant from 30 years old by placing a mark on the line representing 30 years old that is spatially closer or further from "today". Participants then ranked eight benefits of exercise (four ST and four LT) in order of importance to them. Motivation and intention to exercise were also assessed to investigate the effects of time perception on these variables.

Next, participants were asked to read two short passages about the benefits of exercise—one highlighted the ST benefits and the other highlighted the LT benefits of exercise. Participants rated each of the passages (on a scale of 1-10) for how effective they thought each of them was at emphasizing the importance of exercise to them.

Participants indicated how close or distant 30 years old felt to them on a continuous subjective timeline, with the endpoints "feels very close" to "feels very distant". This measure was to check the effectiveness of the timeline manipulation that was used; people in the future-close condition were expected to report feeling closer to 30 years old than people in the future-far condition, and the control group. Participants also reported their levels of physical activity over the past 2 weeks, how physically fit they perceived themselves to be on a scale of one to 10, how physically fit they reasonably expected to be in one year, and how far 1 year subjectively felt to them on a scale of one to 10.

The Rosenberg Self-Esteem Scale (Rosenberg, 1965) was administered to the participants, along with the Zimbardo Time Perspective Inventory[5] (Zimbardo & Boyd, 1999). These measures were to help determine the effect that self-esteem (SE) and TP have on factors such as people's intention to exercise and the importance people give to short- and long-term benefits of exercise. Finally, participants were given the opportunity to write what they specifically thought the study was about, if in fact they thought they knew (i.e., a suspicion probe).

Results and Discussion

Manipulation check. A one-way ANOVA revealed no significant difference between conditions on how far 30 years old subjectively feels, $F(2, 70) = 1.39, p = .26$. However, a planned contrast comparing the two experimental conditions revealed a trend such that people in the F-C condition reported feeling closer to 30 years old ($M = 7.27$, $SD = 2.19$) than those in the F-F condition ($M = 8.14$, $SD = 1.46$), $F(2, 70) = 1.39, p = .11$ (see Table 1). The control condition was in the middle ($M = 7.57$, $SD = 2.04$).

Table 1

Intention, Motivation, ST Ranking, LT Ranking, ST Passage Rating and LT Passage Rating Means by Time Perception Condition.

		Condition		
Measure		Future-far	Future-close	Control
Intention	*M*	3.29	3.17	3.96
	SD	.76	1.12	.77
	N	28	22	23
Motivation	*M*	6.64	6.45	7.70
	SD	2.53	2.15	1.87
	N	28	12	23
ST benefit ranking (lower scores mean more important)	*M*	15.50	15.05	15.83
	SD	4.27	4.03	4.91
	N	28	22	23
LT benefit ranking (lower scores mean more important)	*M*	20.46	20.95	20.17
	SD	4.28	4.03	4.91
	N	28	22	23
ST passage rating	*M*	8.18	7.95	8.17
	SD	1.61	1.05	1.27
	N	28	22	23
LT passage rating	*M*	7.54	6.91	7.13
	SD	1.61	1.69	1.52
	N	28	22	23

Unfortunately, the manipulation did not have as strong an effect on perceived distance of 30 years old as expected. However, the manipulation check measure was taken after most of the dependent variables. Its effect on participants' time perceptions conceivably could have been stronger immediately after participants completed the manipulation and may have subsided by the time the manipulation check was taken.

Effects of condition on dependent measures. A ST benefit score and LT benefit score were computed by summing the rankings of all of the ST benefits, then all of the LT benefits. Therefore, lower scores indicate a higher ranking of importance, and there is a -1.00 correlation between ST and LT benefit ranking scores. ANOVAs were conducted to test the effects of condition on the dependent variables of motivation, intention, self-reported fitness, ST benefit score, LT benefit score, ST passage rating, and LT passage rating.

There was a significant difference between conditions on intention to exercise, $F(2, 70) = 4.59, p = .01$. Tukey HSD post hocs indicated that the control condition had higher motivation to exercise than both the F-C condition ($p = .03$) and the F-F condition ($p = .02$). However, this finding appears to be due to pre-existing differences between conditions that random assignment failed to address. The control condition reported greater intention to exercise, but when an ANCOVA was conducted controlling for reported amount of exercise in the past two weeks, the effect was no longer significant $F(2, 69) = 1.82, p = .17$. Therefore, it appears that there were more people with high levels of exercise (and therefore greater intention to exercise) assigned to the control condition, and simply being in the control condition did not actually affect intention to exercise.

There were no significant differences between conditions for the dependent variables of motivation, ST and LT benefit ranking scores, and ST and LT passage ratings, $Fs < 2.10$, $ps > .13$, and planned contrasts revealed no significant differences between the future-close and future-far conditions.

Although the manipulation did not have an effect on how people ranked and rated the benefits of exercise, we also wanted to investigate whether people who ranked either ST or LT benefits as more important also rated the same type of passage as more convincing. Pearson bivariate correlations were conducted with the variables of ST and LT cost rankings, and ST and LT benefit passages, and the pattern of correlations were in the predicted direction. Ranking ST benefits lower (i.e., of greater importance) was related to higher ratings of the ST passage $r(71) = -.32$, $p = .006$. Also, ranking ST benefits as more important was related to rating the LT benefit passage as less convincing, $r(71) = .29$, $p = .01$.[6]

This pattern of correlations indicates that people who rank ST (or LT) benefits as most important also find messages that highlight these benefits to be more convincing. Exercising has a host of benefits associated with it, but it appears that there are individual differences in how important people deem different types of benefits; what may be a significant reason for one person to exercise is not necessarily what another person thinks is important. Furthermore, the message that incorporates one's personal beliefs about what benefits are most important is also more convincing. Therefore, it may be wise for exercise promotion materials to highlight a range of benefits that will appeal to audiences with different health priorities.

Time perspective. ANOVAs conducted to test relations between gender and the three TPs (P-H, P-F, and future) found a main effect of gender—females were higher on

future TP ($M = 42.15$, $SD = 6.68$) than males ($M = 36.10$, $SD = 5.28$), $F(1, 55) = 7.21$, $p = .01$. However, this finding should be interpreted with caution, as there were only 10 males in the analysis.

ANOVAs were conducted testing differences between conditions for all three time perspectives entered. These found a significant difference between conditions on present-fatalistic (P-F) TP, $F(2, 55) = 5.39$, $p = .007$. A planned contrast revealed that people in the F-C condition had higher P-F TP ($M = 18.00$, $SD = 3.03$) than those in the F-F condition ($M = 14.52$, $SD = 3.69$), $F(2, 55) = 5.39$ $p = .002$. This finding was not predicted and it may be a methodological issue that random assignment failed to address; perhaps more people with higher P-F TP were assigned to the F-C group.

Median splits of the three TPs were examined individually as moderating variables on the dependent measures. ANOVAs were conducted for each TP testing the main effects of TP, and the condition by TP interaction on the dependent variables: motivation, intention, self-reported fitness, exercise, ST benefit ranking, LT benefit ranking, ST passage rating, and LT passage rating. The interaction term allowed us to test each time perspective as a moderator. The main effects of condition are not reported in any of the TP ANOVAs because they were reported above.

Present-hedonistic (P-H) TP. ANOVAs testing the effects of present-hedonistic (P-H) TP and condition on the dependent variables found no significant effects, $Fs < 2.54$, $ps > .12$. There were also no significant effects of the P-H TP by condition interaction, $Fs < 2.27$, $ps > .14$.

Present-fatalistic (P-F) TP. ANOVAs testing the effects of present-fatalistic TP and condition on the dependent variables found a marginal effect of P-F TP, such that people high in P-F TP rated the ST passage higher ($M = 8.35$, $SD = 1.25$) than did people

low in P-F TP ($M = 7.78$, $SD = 1.48$), $F(1, 52) = 3.33$, $p = .074$. P-F TP was not related to motivation, fitness, exercise, ST ranking, LT ranking, or LT rating, $Fs < 1.68$, $ps > .20$.

There was a significant P-F TP by condition interaction effect on intention to exercise, $F(2, 52) = 4.63$, $p = .01$. Simple effects analyses revealed that in the F-F condition, those with a high P-F TP score intended to exercise more ($M = 3.44$, $SD = .53$) than those with a low score ($M = 2.93$, $SD = .73$), $F(1, 35) = 4.00$, $p = .05$. In the F-C condition, the effect was reversed; those with a low P-F TP score intended to exercise more ($M = 3.80$, $SD = 1.30$) than those with a high score ($M = 2.64$, $SD = .92$), $F(1, 35) = 4.62$, $p = .04$.

People in the F-C condition have greater intention to exercise, particularly when they are low in P-F TP, perhaps because they feel they have more control over the psychologically close LT future outcomes (i.e., they tend not to have a fatalistic outlook on the future), and therefore intend to try to affect their future health. People in the F-F condition intended to exercise more when they were high in P-F TP. This finding was not predicted and is somewhat surprising. Perhaps feeling far from the LT future benefits has a detrimental effect on low P-F TP people's intention to exercise because even though they feel that they have control over their outcomes (i.e., they are low in present-fatalism), there is little incentive to work towards these benefits when they feel very distant. However, this effect was not expected, and the proposed explanation is speculative.

Future TP. ANOVAs testing the effects of future TP and condition on the dependent variables found a main effect of future TP on ratings of the ST benefit passage; those high on future TP rated the ST benefit passage higher ($M = 8.41$, $SD = 1.52$) than those low on future TP ($M = 7.69$, $SD = 1.09$), $F(1, 52) = 3.89$, $p = .05$. There

were no other significant main effects of future TP on any other dependent variables, *Fs* < 1.21, *ps* > .28.There were no significant interactions between condition and future TP on any of the dependent variables, *Fs* < 1.86, *ps* > .17.

The finding that people with high future TP rated the ST benefit passage higher than those low on future TP is somewhat surprising, especially since there was no difference between high and low future TP on rating of the LT benefit passage. People with a future TP seem to be more focused on the benefits of exercise, namely the ones that will occur in the ST, and it is unclear why this would be.

Correlations. Pearson bivariate correlations were conducted with the variables of motivation to exercise, intention to exercise, self-reported physical fitness, exercise, ST benefit ranking score, LT benefit ranking score, SE, P-H TP, P-F TP, future TP, ST passage rating score, and LT passage rating score. Only the significant correlations are reported below.

Motivation to exercise, intention to exercise, and physical fitness, all seem to fit together, as they are all strongly (positively) correlated with each other (see Table 2). In addition, they are all strong predictors of exercise behaviours; people with higher levels of exercise also report feeling motivated to exercise, $r(71) = .61$, $p < .001$, have intentions to exercise more, $r(71) = .76$, $p < .001$ and report higher levels of fitness, $r(71) = .58$, $p < .001$. Motivation (but not intention or physical fitness) is related to future TP; those who reported higher future TP also reported being more motivated, $r(71) = .27$, $p = .04$. Perhaps people who are focused on future outcomes feel more motivated to achieve the benefits of exercise. However, this motivation does not translate to one's intention to exercise or actual exercise behaviour, maybe because people high in future TP are also more apt to be motivated to achieve goals that are unrelated to exercise. They feel

Table 10

Pearson Correlation Coefficients for the Dependent Measures (n = 47)

	1	2	3	4	5	6	7	8	9	10
1. Present-hedonistic TP	—	.24	-.52**	-.01	-.04	.12	.21	-.02	-.02	.27^{t}
2. Present Fatalistic TP		—	-.40**	-.24^{t}	-.45*	-.08	.05	.01	.10	-.43*
3. Future TP			—	.09	.42*	.18	-.12	.08	.20	.10
4. Baseline fitness				—	.40*	.04	.35	-.45**	.18	.40*
5. Follow-up fitness (n = 25)					—	.19	.54**	-.30	.28	.57
6. Belief						—	-.15	.26	.09	.27
7. Motivation							—	.60**	.29*	.36*
8. ST cost								—	-.35*	-.38*
9. LT benefit									—	.09
10. Self-esteem										—

Note: **p < .01, *p < .05, ^{t}p < .10

motivated to achieve the benefits of exercise, but they also have a number of other LT benefits (unrelated to exercise) that they are focused on, and exercising is not as high on their list of priorities.

Higher ratings of the LT benefit passage were significantly related to higher motivation, $r(71) = .24, p = .04$, intention to exercise more, $r(71) = .24, p = .04$, and better physical fitness, $r(71) = .27, p = .02$. It was also marginally related to exercise behaviour, $r(71) = .23, p = .055$. People who report feeling most convinced by the arguments in the LT benefits passage appear to be the people who are also more motivated and exercising more.

Higher ratings of the ST benefit passage were marginally related to higher motivation, $r(71) = .20, p = .089$, and intentions, $r(71) = .20, p = .088$. Ratings of the ST benefit passage were not related to fitness or exercise, $rs < .16, ps > .19$. In sum, ratings of the ST benefit passage are not as strongly related to motivation, intention, fitness, or exercise as ratings of the LT benefit passage. A paired-samples T-test revealed that the ST benefit passage was rated significantly higher ($M = 8.11, SD = 1.34$) than the LT benefit passage ($M = 7.22, SD = 1.62$), $t(72) = 3.91, p < .001$. People were generally more convinced by the ST benefits passage than the LT benefits passage. Perhaps this is a reason why the same correlations were not found with the ST benefit passage as were found with the LT benefit passage; most people are convinced by the ST messages, but generally the people who deem both the ST and LT benefits as important are more motivated and intend to exercise more.

Future TP was negatively correlated with P-H TP, $r(57) = -.49, p < .001$. This simply indicates that people are generally either more focused on future outcomes, or else being happy in the present; people high in one domain are usually lower in the other.

Finally, SE was negatively correlated with P-F TP. This may indicate that people who are low in SE feel lower in self-efficacy and do not feel as though they have much control over their future. Therefore, they may be more apt to take a laissez-faire attitude in the present than to focus on changing future outcomes.

For Study 2, we hypothesized that inducing participants to feel subjectively closer to the LT benefits of exercise would lead them to rank these benefits as more important than would people who were induced to feel distant from the LT benefits, but this hypothesis was not supported. We had also predicted that people who were high on future TP would report more exercise than people low on future TP, but this hypothesis was also not supported. The manipulation appears to have had only a weak effect on people's time perception, so it could be that the manipulation was not strong enough to affect how much people value ST versus LT benefits. Also, it could be that the amounts that people value various future outcomes are enduring and therefore immoveable using a brief time-line manipulation as used in Study 2. In Study 3, a similar time-line manipulation is used to induce people to feel close to or distant from the benefits of exercise experienced after six weeks. However, in Study 3, participants completed the time perception manipulation every day for four weeks to test whether feeling close to the benefits of exercise (over time) leads people to be more motivated to exercise, to focus more on the LT benefits than on the ST costs, and to therefore exercise more. Perhaps this longitudinal time perception manipulation will have a stronger effect on how distant the future feels and, in turn, how much participants focus on the LT benefits of exercising.

Study 3

The purpose of Study 3 is to take theory to practice and test the causal effects of time perception on people's actual exercise behaviour over the course of four weeks. The

study began by informing participants of the physical and mental benefits they can expect to achieve by the end of six weeks if they exercise consistently. The benefits that the participants were made cognizant of were: improved mental alertness, increased energy, reduced stress, increased flexibility, and stronger cardiovascular system. Both LT goal focus and ST cost focus were measured throughout the four-week session as possible mediators between perceived distance and exercise behaviour. It was hypothesized that making LT benefits feel closer would result in people putting more emphasis on LT goals than on the ST costs, and that this increased focus on the LT benefits would lead to increased physical activity. Participants were selected for their low levels of physical activity because the above-stated goals are attainable within six weeks of exercising regularly if one is currently sedentary.

Exercise motivation was measured as a possible mediator between perceived time and exercise behaviour. That is, perhaps participants who were induced to feel that the future is close would be more motivated to achieve LT benefits of exercising because these benefits felt closer and more tangible, and they would therefore engage in more physical activity. Participants who were induced to feel like the future is far away would feel less motivated to exercise because the benefits of exercise felt distant and unattainable. Focus on ST costs and LT benefits was measured throughout the four-week study as a second potential mediator between perceived time and exercise behaviour. ST cost and LT benefit focus were operationalized as participants' ratings of how important these costs and benefits were in their decisions to exercise or not exercise. It was hypothesized that the LT benefits of exercise would become salient to people who were induced to feel close to the end of their six-week goals and that these benefits would outweigh the ST costs associated with exercise in their decisions to exercise. That is, the

LT benefits would loom larger than the ST costs for people who were induced to feel that the future is near.

Participants were randomly assigned to one of two manipulation conditions, or one of two control conditions. The two manipulation conditions were future-close (F-C) and future-far (F-F), and this means that 6 weeks from the beginning of the study was made to feel subjectively close or far, respectively, using a time-line manipulation. Participants in the control conditions did not receive a perceived time manipulation, but they still completed the dependent measures. One control group reported their exercise behaviour on a Palm Pilot (as did both experimental conditions) and the other control group reported it on a weekly basis using a pen and paper questionnaire.

We hypothesized that if people were induced to feel that the end of the 6-week period—at which time they should begin to reap the benefits of regular exercise—was temporally close, they would perceive these benefits as more important and salient. People who perceived the six-week period as distant were not expected to exercise as much because they would see the benefits of exercising as less tangible and further away. Therefore, it was hypothesized that participants in the F-C condition would exercise significantly more than participants in the other three conditions because the positive outcomes would feel closer and thus be more salient and more tangible. Furthermore, we expected a difference between the two control conditions, such that participants in the control Palm Pilot (CPP) condition would exercise more than participants in the no Palm Pilot (NPP) control condition because having to fill out the questionnaires on the Palm Pilots would act as a prompt. Previous research found that increased frequency of prompting affected adherence to a walking program (Lombard, Lombard, & Winett, 1995). The researchers found that more frequent prompting—phone calls to the

participants to ask how their walking program was going—increased exercise adherence. In the current study, having to fill in a daily log on the Palm Pilot of how much one exercised was a prompt, or reminder, to exercise and could potentially have an effect on participants' motivation. Including the NPP condition provided a prompt-free control condition. Since participants in the control condition who do not have the Palm Pilots were not prompted daily by having to complete the measures, they were expected to exercise less.

In terms of exercise motivation, it was hypothesized that participants in the F-C condition would report being significantly more motivated than participants in the other three conditions. For the dependent variable of ST cost and LT goal focus, participants in the F-C condition were expected to rate the LT benefits as more important in their decisions of whether or not to exercise and ST costs as less important than the other three conditions. In addition, participants' beliefs that they would achieve the benefits after six weeks of regular exercise were expected to moderate the effects of condition on motivation and exercise behaviour. It was expected that participants who reported high beliefs that they would attain the benefits would report more motivation and exercise in the F-C condition than in the F-F condition, but there would be no difference between F-C and F-F for participants who had low belief scores. Time perspective (Zimbardo & Boyd, 1999) was also measured to examine its relation with participants' motivation to exercise, exercise behaviour, ST cost rating, and LT benefit rating.

Method

Participants

Included in the questionnaire from Study 1 was an invitation to be contacted for Study 3—a four-week longitudinal study to track participants' physical activity. Students

who agreed to be contacted by phone or email for the study were invited to participate if they indicated that they performed less than one hour per week of moderate or vigorous exercise, and they answered no to all questions on the PAR-Q, which indicated that they were physically ready to exercise. Forty-seven undergraduate students at Wilfrid Laurier University (23 females and 24 males) participated for course credit and they also received a ballot in a draw for three prizes of fifty dollars, which were drawn at the conclusion of the study. One female participant dropped out from the study after two weeks of participation which left 22 females and 24 males in the sample after two weeks.

Materials and Procedure

Participants were informed at the onset of the study of the benefits of exercising and the results they should come to expect after six weeks of regular physical activity: improved mental alertness, increased energy, reduced stress, increased flexibility, and a stronger cardiovascular system. All of these benefits of exercise highlight potential gains that participants can experience. The positive outcomes are worded this way because previous research suggests that messages that highlight potential gains promote health-protective behaviours better than messages that highlight potential losses if one does not engage in the prescribed behaviour (Detweiler, Bedell, Pronin, & Rothman, 1999). The students were informed that in order to achieve these benefits, they would have to exercise at least four times per week, and for at least 30 minutes each time. The types of exercise appropriate for this study were moderate to vigorous cardiovascular exercises including (but not limited to) swimming, brisk walking, jogging, cycling (including stationary) and group fitness classes. Participants were also given information about performing a proper workout to help avoid injury (see Appendix C).

After receiving information about the benefits of exercise and how to achieve them, participants completed a questionnaire which included a self-report fitness scale (see Appendix D), a measure of how much they believed they would achieve the benefits that had been mentioned previously (see Appendix E), The Rosenberg Self-Esteem Scale (Rosenberg, 1965), and the Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999).

Participants also completed baseline measures (and subsequent weekly measures) of how much they considered ST costs and LT benefits in deciding whether or not to exercise (see Appendix F), their motivation to exercise (see Appendix G), and how far the 6-week fitness goal subjectively felt to them (see Appendix H). They were then randomly assigned to one of four conditions: future-close (F-C), future-far (F-F), control Palm Pilot (CPP), or control no Palm Pilot (NPP). The reason Palm Pilots were used to record the dependent measures is two-fold. Since the participants completed numerous measures over the course of the study, having them complete them on Palm Pilots was more efficient, because they could fill them out on their own time and wherever they want (within that day). Secondly, recording their responses in real-time would help to increase accuracy of the participants' reports. It has been found that reports of health behaviours at a later date can be very inaccurate (Hoorens & Harris, 1998)

Participants in the two experimental conditions completed the time perception manipulation once per day. All participants in the three Palm Pilot conditions kept track of their exercise by filling in a daily log of the length and intensity of their physical activity they did that day. They also completed a 5-question measure of their enjoyment of the exercise that day (see Appendix I for manipulation and exercise measures). The NPP control group completed these measures (exercise length, intensity, and enjoyment)

with a weekly pen and paper questionnaire (see Appendix J). The questionnaire at the final week also included a measure of how far 4 weeks ago subjectively felt (see Appendix K) and a measure of the responses to the fitness questionnaire that they recalled giving at the beginning of the study (see Appendix L). At the end of the study, participants were probed for suspicions, fully debriefed on the purpose of the study and thanked for their participation. Participants were also given the option to volunteer to participate in a follow-up study that involved one phone call two weeks after the study (six weeks from the beginning of the study) to ask them about their fitness levels and exercise behaviour at that time. Twenty-five of the forty-six participants agreed to receive a phone call and all 25 completed the follow-up self-reported fitness measure.

Results and Discussion

Participants in the NPP condition completed all measures once per week. For participants in the three conditions with Palm Pilots, length of exercise, exercise intensity, and exercise enjoyment were assessed on a daily basis (the remaining measures were completed weekly.) Daily measures on the Palm Pilots were aggregated to create a weekly average of each of the daily factors for weeks one, two, three, and four.

Analyses of alpha-levels on each of the scales were conducted to determine how well the items hang together for each factor examined. This was important to assess, especially for the measures of fitness, ST cost rating, LT benefit rating, belief in achieving specified fitness goals, motivation to exercise, and exercise enjoyment, as the scales assessing these constructs were used for the first time in this study. Alpha levels were generally acceptable, with the exceptions of future TP, (alpha = .69) and follow-up fitness, (alpha = .61, see Tables 3 and 4.)

Table 3

Alpha Levels for Scale Items Used, by Week.

	Time				
Factor (# items)	Baseline	1	2	3	4
ST cost (5)	.79	.75	.79	.84	.80
LT benefit (5)	.71	.70	.80	.68	.78
Motivation (5)	.82	.87	.86	.87	.87

Table 4

Alpha Levels for Scale Items Used

Factor (# items)	Alpha
Baseline fitness (5)	.75
Follow-up fitness (5)	.61
Present-hedonistic (16) TP	.79
Present-fatalistic (7) TP	.81
Future TP (12)	.69
Beliefs (5)	.84
Self-esteem (10)	.90

There were no significant differences between conditions on any of the dependent measures before the manipulation, which addresses the possibility of condition effects being confounded by pre-existing differences between the groups. Participant gender did not significantly qualify any of the reported findings and it therefore receives no further mention.

Both participants' belief (median split) scores and future TP (median split) scores were tested for main effects and interactions with condition on the main dependent variables of exercise, motivation, ST costs and LT benefits. ANOVAs revealed no main effects of belief scores and no main effects of future TP on the dependent variables, $Fs < 1.21$, $ps > .28$. There were also no interactions, indicating that neither belief scores nor future TP were significant moderators, $Fs < 1.11$, $ps > .36$.

Manipulation check. An aggregate score for perceived distance was created for each participant by computing a mean score of how far the 6-week goal felt at one week, two weeks, three weeks, and four weeks into the study (T1 to T4). A one-way ANCOVA testing differences between the four conditions on the aggregate score for perceived distance, controlling for baseline perceived distance prior to the manipulation, was significant, $F(3, 42) = 3.63$, $p = .02$. A planned contrast revealed that participants in the F-C condition felt that the 6-week goal was significantly closer than the F-F condition, $F(3, 42) = 3.64$, $p = .02$. Another planned comparison showed that the F-C condition was rated as significantly closer to the 6-week goal than the average of the other three conditions, $F(3, 42) = 3.64$, $p = .003$ (see Table 5). Analyses were also conducted to break down the effects of the time perception manipulation by week. One week into the study at T1, a one-way ANCOVA controlling for baseline measure of perceived distance revealed no significant differences between conditions on subjective distance from the

Table 5

Rating of How Close the 6-week Score Feels Each Time by Condition, Controlling for Baseline Measure

Time		Condition			
		F-C	F-F	CPP	NPP
1	*M*	78.59	86.40	101.42	74.33
	SD	28.17	28.30	27.82	27.78
	N	12	13	12	8
2	*M*	49.11	82.47	83.58	83.12
	SD	32.89	32.84	32.49	32.54
	N	12	12	12	9
3	*M*	36.92	65.32	51.40	59.35
	SD	26.19	26.04	25.71	25.76
	N	12	11	10	10
4	*M*	29.55	56.34	48.99	63.11
	SD	28.30	28.30	28.11	28.11
	N	11	12	10	9
Total	*M*	48.30	72.63	75.59	68.09
	SD	22.43	22.40	22.11	22.13
	N	12	13	12	10

Note: Lower numbers indicate feeling closer to the 6-week goal.

6-week goal, $F(3, 40) = 2.00, p = .13$. From T2 to T4, the ANCOVA analyses revealed significant or marginally significant differences between conditions, $Fs > 2.45$, $ps < .09$. Although analyses would not normally be conducted when the overall F-value is non-significant, planned contrasts are used in the following analyses (including cases where the overall F was not significant).

There was a low number of participants and therefore the analyses had low power. Some predicted effects that could go undetected in the overall ANOVA may be found using more focused tests. Hence, planned comparisons were used to explore this possibility. Planned contrasts at T1 were non-significant, $F(3, 40) = 1.99, p = .13$. Planned contrasts for T2, T3, and T4 showed that participants in the F-C condition felt significantly closer to their 6-week goal than did those in the F-F condition, $Fs > 2.45$, $ps < .03$, and that participants in the F-C condition felt significantly closer to the 6-week goal than did the average of participants in the other three conditions, $Fs > 2.45$, $ps < .02$.In sum, these analyses indicate that the time perception manipulation was effective at inducing participants in the F-C condition to feel significantly closer to their 6-week goal than participants in the F-F condition. Although the manipulation did not seem to be clearly effective after week one, it appears to have worked in subsequent weeks, and overall (see Figure 2).

Exercise. A repeated measures ANOVA, with baseline amount of exercise and length of exercise at T1 to T4 (5 levels) as the within-subjects variable and condition as the between-subjects variable, was conducted. Mauchly's test of sphericity indicated a violation of homogeneity, so a Huynh-Feldt correction was used. There was a marginally significant main effect of time, $F(2.75, 104.40) = 2.41, p = .077$, but planned contrasts failed to reveal that participants exercised less at baseline than they did during T1 to T4,

$F(1, 38) = 2.38, p = .13$. There was no main effect of condition, $F(3, 38) = 1.32, p = .28$. The time by condition interaction was also non-significant, $F(8.24, 104.40) < 1$, indicating that participants' changes exercise levels across time were independent from the condition they were in.

A repeated measures ANOVA with 2 levels—baseline exercise and mean of exercise T1 to T4—conducted to examine exercise levels before and during participation in the study revealed a marginally significant main effect of time, $F(1, 43) = 3.40, p = .072$. Participants exercised more from T1 to T4 ($M = 1.87$, $SD = 1.08$) than they did before the study began ($M = 1.37$, $SD = 1.49$). There was no main effect of condition, $F(3, 43) < 1$. Also, there was no time by condition interaction, $F(3, 43) < 1$, suggesting that the participants' changes in exercise levels after starting the study were independent from the condition they were in.

A one-way ANCOVA, controlling for baseline fitness, testing the differences between conditions on their overall aggregated exercise score from T1 to T4, was non-significant, $F(3, 43) = 1.45, p = .24$. The means, however, are in the predicted direction, such that F-C is higher than F-F (see Figure 3).

Analyses were conducted to test for differences between conditions at each week individually (T1 to T4) on exercise behaviour, controlling for overall baseline fitness scores (see Table 6). At T1, the ANCOVA analysis showed a marginal effect of condition on exercise, $F(3, 43) = 2.75, p = .054$ (see Figure 4). Planned contrasts revealed that the F-C condition exercised significantly more than the mean of the other three conditions, $F(3, 43) = 2.75, p = .04$. From T2 to T4, the overall ANCOVA analyses revealed no significant differences between conditions on exercise, $F < 1, p = .23$, and planned contrasts also did not approach significance.

Table 6

Amount of Exercise Each Time by Condition, Controlling for Baseline Fitness

Time		Condition			
		F-C	F-F	CPP	NPP
1	*M*	2.34	1.85	1.95	1.16
	SD	.98	.98	.98	.98
	N	12	13	12	10
2	*M*	1.73	1.45	2.09	1.18
	SD	.314	.302	.314	.344
	N	12	13	12	10
3	*M*	2.15	2.10	2.25	1.44
	SD	1.26	1.27	1.26	1.26
	N	12	12	12	10
4	*M*	2.27	1.67	2.44	2.02
	SD	1.45	1.45	1.45	1.45
	N	12	11	10	9
Total	*M*	2.12	1.72	2.16	1.44
	SD	.96	.96	.96	.96
	N	12	13	12	10

Note: 1 = 10 to 19, 2 = 20 to 29, 3 = 30 to 39, 4 = 40 to 40, 5 = 50 or above, average minutes per day.

The means of the total exercise score over four weeks suggest that perhaps people in the F-C condition are exercising slightly more than those in the F-F condition. However, the difference is slight and non-significant, so a firm conclusion can not be drawn from these means.

The repeated measure analysis comparing baseline exercise with total exercise from T1 to T4 indicated an increase in exercise levels from before to during participation in the study. It could be that merely being in the study induced people to focus on the LT goals of exercising. Participants were reminded at the beginning of the study that they should achieve certain fitness goals if they continue to exercise regularly over the next six weeks. Perhaps participants' resulting focus on the future largely overrode any effects that the time perception manipulation had. This interpretation would be consistent with Hall and Fong's (2001) findings with an experimental group that received a future-focused intervention—these participants focused on the LT benefits and exercised more than the control conditions. All participants in the current study received information to have them focus on the LT outcomes and this may have had an effect over and above subjective temporal distance from the benefits of exercise.

Motivation. A repeated measures ANOVA was conducted with baseline motivation and motivation at T1 to T4 (5 levels) as the within-subjects variable, and condition as the between-subjects variable. There was a significant main effect of time, $F(4, 140) = 4.00$, $p = .004$, and a polynomial trend analysis revealed a linear trend wherein motivation increased with time, $F(1, 35) = 9.11$, $p = .005$. There was no main effect of condition, $F(3, 35) < 1$. The time by condition interaction was also non-significant, $F(12, 140) < 1$, indicating that participants' changes in motivation across time were independent from the condition they were in.

A total motivation score was computed, using the mean motivation scores from T1 to T4. A repeated measures ANOVA with 2 levels—baseline motivation and mean motivation scores from T1 to T4—conducted to examine levels of motivation before and during participation in the study revealed that motivation scores were significantly lower at the beginning of the study ($M = 3.68$, $SD = 1.36$) than they were during the study ($M = 4.31$, $SD = .93$), $F(1, 43) = 11.95$, $p < .01$. However, there was no time by condition interaction, $F(3, 43) < 1$, indicating that the participants' increases in motivation levels after starting the study were independent from the condition they were in.

A one-way ANCOVA controlling for baseline motivation at the beginning of the study, and testing for differences between conditions on participants' motivation aggregated over four weeks was non-significant, $F(3, 42) < 1$. However, the total motivation scores are in the predicted direction, such that participants in the F-C condition reported the highest motivation (see Table 7). Motivation was examined at each week individually from T1 to T4, controlling for baseline motivation. The ANCOVA analyses for T1 to T4 revealed no significant differences between conditions on motivation at each week, $Fs < 1$, $ps > .16$ (see Table 7).

The repeated-measures analysis examining people's motivation before and during participation in this study indicates that participants' levels of motivation may have increased simply from participating. This is likely partially due to a self-selection bias in the sample; people who already had a desire to increase their current levels of physical activity were sought for the study. However, simply taking part in this study and recording their exercise behaviour may have been a motivating factor for participants.

Short-term costs and long-term benefits. A total score for both short-term (ST) costs and long-term (LT) benefits was computed by aggregating the means of the scores

Table 7

Motivation Each Time by Condition, Controlling for Baseline Motivation.

Time		Condition			
		F-C	F-F	CPP	NPP
1	*M*	4.56	4.29	4.02	4.08
	SD	1.06	1.06	1.06	1.12
	N	12	13	12	10
2	*M*	4.29	4.41	4.05	4.15
	SD	1.23	1.23	1.23	1.23
	N	12	12	12	10
3	*M*	4.77	4.33	4.67	4.40
	SD	1.15	1.15	1.15	1.15
	N	12	11	10	10
4	*M*	4.25	4.05	4.25	5.10
	SD	1.06	1.06	1.07	1.07
	N	11	12	10	9
Total	*M*	4.48	4.22	4.18	4.39
	SD	.84	.84	.83	.83
	N	12	13	12	10

for each week (T1 to T4).

A repeated measures ANOVA with 2 levels—baseline ST cost rating and mean ST cost ratings aggregated from T1 to T4—conducted to examine ST cost ratings before and during participation in the study revealed that ST cost ratings were significantly higher at the beginning of the study ($M = 3.72$, $SD = 1.13$) than they were during the study ($M = 3.48$, $SD = 1.04$), $F(1, 43) = 4.85$, $p = .03$. However, there was no time by condition interaction, $F(3, 43) < 1$, indicating that the participants' decreases in ST cost ratings after starting the study were independent from the condition they were in.

A one-way ANCOVA, controlling for the baseline score of ST costs to examine differences between conditions on overall ratings of ST costs from T1 to T4, was non-significant, $F(3, 42) < 1$. Next, a one-way ANCOVA was conducted at each separate time to explore differences in consideration of ST costs between conditions by week. The ANCOVA analyses from T1 to T4 revealed no significant differences between conditions on ratings of ST costs, $Fs < 1$ (see Table 8).

A repeated measures ANOVA with 2 levels—baseline LT benefit rating and mean LT benefit ratings from T1 to T4—conducted to examine LT benefit ratings before and during participation in the study did not reach significance, $F(1, 43) = 1.49$, $p = .23$. However, the means are in the predicted direction, such that LT benefit ratings were lower at the beginning of the study ($M = 4.88$, $SD = .92$) than they were during the study ($M = 5.00$, $SD = .79$).

A one-way ANCOVA controlling for the baseline score of LT benefits and examining differences in LT benefit ratings across all times (T1 to T4) did not reach significance, $F(3, 42) = 1.81$, $p = .16$. A planned contrast revealed that the F-C condition considered the LT benefits less than the mean of the other three conditions, $F(3, 42) =$

Table 8

ST Cost Rating Each Time by Condition, Controlling for Baseline ST Cost Rating

Time		Condition			
		F-C	F-F	CPP	NPP
1	*M*	3.68	3.61	3.25	3.53
	SD	.71	.70	.71	.72
	N	12	13	12	10
2	*M*	3.69	3.54	3.49	3.41
	SD	.71	.74	.72	.73
	N	12	13	12	10
3	*M*	3.20	3.49	3.13	3.44
	SD	.95	.95	.96	.97
	N	12	12	12	10
4	*M*	3.39	3.55	3.41	3.53
	SD	.96	.88	.93	.93
	N	12	11	10	9
Total	*M*	3.49	3.57	3.35	3.50
	SD	.68	.67	.68	.69
	N	12	13	12	10

1.81, $p = .03$ (see Table 9). This outcome was unexpected, as it was hypothesized that the F-C condition would consider the LT benefits more than the other three conditions.

Next, a one-way ANCOVA was conducted at each separate time to explore differences in consideration of LT benefits between conditions by week. The ANCOVA analyses from T1 to T4 revealed no significant differences between conditions on ratings of LT benefits, $Fs < 2.09$, $ps > .12$. However, at T3, planned contrasts revealed that the F-C condition had a lower LT benefit score than the mean of the other three conditions, $F(3, 40) = 2.09$, $p = .02$, and that participants in the F-C condition had lower LT benefit scores than those in the F-F condition, $F(3, 40) = 2.09$, $p = .04$. At T4, a planned contrast revealed a trend such that the F-C condition rated the LT benefits lower than the F-F condition, $F(3, 37) = 1.50$, $p = .078$. The findings of the planned contrasts at T3 and T4 were surprising because it was hypothesized that F-C participants would rate LT benefits higher than the participants in the F-F condition.

Contrary to predictions, participants in the F-C condition tended to rate LT benefits as slightly less important than did the other conditions. A possible interpretation of this result involves Construal Level Theory (CLT). In past research, participants were asked to describe and rate a "good" or "bad" day tomorrow or a year from now (Liberman et al., 2002). Good (bad) days a year from now were rated as significantly better (worse) than those that would occur tomorrow. This suggests that a positive outcome that is temporally far in the future is seen through "rosier lenses" because it is construed on a high (schematic) level which leads one to focus on desirability rather than feasibility. In the current study, perhaps participants in the F-C condition construed LT benefits on a low level, thus leading them to focus more on the feasibility aspects, and less on the

Table 9

LT Benefit Rating Each Time by Condition, Controlling for Baseline LT Benefit Rating

Time		Condition			
		F-C	F-F	CPP	NPP
1	*M*	4.84	4.92	5.21	4.96
	SD	.67	.69	.67	.67
	N	12	13	12	10
2	*M*	4.63	4.98	4.95	5.21
	SD	.89	.96	.89	.89
	N	12	13	12	10
3	*M*	4.53	5.22	5.15	5.19
	SD	.78	.80	.78	.78
	N	12	12	12	10
4	*M*	4.75	5.13	5.42	5.09
	SD	.77	.73	.74	.74
	N	12	11	10	9
Total	*M*	4.67	5.07	5.16	5.12
	SD	.58	.60	.58	.58
	N	12	13	12	10

desirability aspects of these benefits. However, this result was not predicted and this interpretation is speculative.

The means for ratings of the ST costs and LT benefits before and during participation in the study suggest that the participants are putting less weight into the ST costs and more weight into the LT benefits in their reasons for exercising, simply from participating. Although this difference was not statistically significant for the LT benefits, the means indicate that perhaps just being in the study helped people to focus more on the LT gains and overcome the ST costs of exercising. However, there were no main effects of condition (apart from an unexpected drop in LT benefit rating for F-C condition), indicating that perceived distance did not have an effect on how people perceive the ST costs and LT benefits over the four weeks of the study.

Correlations. Pearson bivariate correlations were conducted with: present-hedonistic TP, present-fatalistic TP, future TP, baseline fitness level, follow-up fitness level, baseline exercise level, total exercise level, belief (in achieving benefits) score, total motivation, total ST cost rating, total LT benefit rating, and self-esteem (SE). Only significant correlations are reported below.

Present-hedonistic TP revealed no significant correlations with any other factors other than a negative relation with future TP, $r(45) = -.52$, $p = .001$ (see Table 10). Present-fatalistic TP was negatively related to future TP, $r(45) = -.39$, $p = .008$. It was also negatively related to follow-up fitness, $r(23) = -.45$, $p = .02$, and negatively related to SE, $r(45) = -.43$, $p = .002$. That is, those with higher present-fatalistic TP reported lower fitness at follow up and lower SE. Future TP was positively related to follow-up fitness level, $r(23) = .42$, $p = .04$, indicating that people who gave higher ratings of future TP

Table 2

Pearson Correlation Coefficients for the Dependent Measures (n = 73)

	1	2	3	4	5	6	7	8	9	10	11	12
1. Motivation	—	.72**	.79**	.61**	.03	-.40	.08	-.08	-.21	.27*	.20^{t}	.24*
2. Intention		—	.57**	.76**	.03	-.03	.02	-.06	-.03	.09	.20^{t}	.24*
3. Fitness			—	.58**	-.02	.01	.12	.04	-.23^{t}	.12	.12	.27*
4. Exercise				—	.08	-.08	.12	.09	-.07	-.05	.06	.21
5. ST benefit rank					—	-1.00*	.04	-.13	-.11	-.01	-.32**	.29*
6. LT benefit rank						—	-.04	.13	.11	.01	.32	-.30*
7. SE (n = 58)							—	.06	-.33*	.01	-.10	-.01
8. TP P-H (n = 58)								—	.21	-.49*	.33*	.16
9. TP P-F (n = 58)									—	-.18	.13	.08
10. TP future (n = 58)										—	.02	-.02
11. ST passage rating											—	.14
12. LT passage rating												—

Note: **p < .01, *p < .05, ^{t}p < .10

were more fit by the end of the study. This finding is consistent with Hall and Fong (2001), who found that people experimentally induced with a future TP exercised more than those in the control conditions. The finding that future TP and follow-up fitness are related in the current study is correlational and we cannot make causal conclusions, but based on past research it seems reasonable to presume that having a future TP, and thus focusing more on future outcomes, leads one to exercise more.

Baseline fitness scores were positively correlated with baseline exercise level, $r(44) = .47, p = .001$, total exercise level, $r(45) = .47, p = .001$, total motivation, $r(45) = .35, p = .02$, and SE, $r(45) = .40, p = .005$. Follow-up fitness scores were significantly positively related to motivation, $r(23) = .54, p = .005$, and to SE, $r(23) = .57, p = .003$. In other words, people who had greatest fitness levels at the end of the study were those who were most motivated and had highest SE. Baseline fitness was negatively correlated with ST cost rating, $r(45) = -.45, p = .002$, indicating that people with higher fitness scores at the beginning of the study rated the ST costs as less important. However, LT benefit rating was not significantly correlated with baseline fitness, $r(45) = .18, p = .23$. This finding may suggest that ST cost rating is a better predictor of fitness level than LT benefit ratings. Consideration of LT benefits may be naturally common across most people, regardless of their fitness levels or physical activity. ST costs, however, may be more pertinent to whether or not someone exercises, and subsequently to one's level of fitness. Also, being in the study may have induced all participants to focus on the LT benefits, regardless of their fitness levels. Because these findings are correlational, we cannot conclude a causal direction. Also, there may be a third variable that is related to both ST cost ratings and physical fitness.

Motivation was significantly related to SE, $r(45) = .36, p = .01$; people high in SE also had high motivation to exercise. There was a significant negative relation between motivation and rating of ST costs, $r(45) = -.60, p < .001$, and a positive correlation between motivation and LT benefit rating, $r(45) = .29, p = .05$. Motivation seems to be a good predictor of how much people consider ST costs and LT benefits of exercising. Higher motivation was associated with rating the ST costs lower and the LT benefits higher. Perhaps being highly motivated to exercise causes one to see beyond the ST costs that tend to deter people from exercising, in order to achieve the LT benefits. An alternative explanation is that focusing more on the ST costs could reduce motivation to exercise because one is unable to see beyond these obstacles and is therefore less motivated to achieve the LT outcomes.

Finally, there were significant negative correlations between ST cost rating and LT benefit rating, $r(45) = -.35, p = .02$, and ST cost rating and SE, $r(45) = -.38, p = .008$. People who rated ST costs lower rated LT benefits higher, and also reported higher SE.

Given the overall pattern of correlations, it seems as though SE is an individual difference variable that plays a role in fitness; it is associated with lower ST costs ratings, higher motivation and higher self-reported fitness levels. Although a causal conclusion cannot be drawn, the fact that SE was measured first suggests that SE leads to higher motivation and fitness, and the alternative direction (that ST consideration and motivation affect SE) is less plausible.

Study 3 was an effort to take theory to practice and examine the effects of a time perception manipulation on participants' motivation, consideration of ST costs and LT benefits, and actual exercise behaviour. Although the manipulation appears to have been somewhat successful at inducing participants in the F-C condition to feel subjectively

closer to the future, the findings generally failed to support the hypothesis that participants who felt close to the six-week benefits would be more motivated to exercise.

Surprisingly, future TP was not a factor that affected participants' exercise, motivation, ST cost ratings, or LT benefit ratings. It was hypothesized that those high in future TP would report higher motivation and exercise behaviour, but it did not have a significant effect on these variables. Future TP was also examined correlationally to test its relation with exercise and fitness. The only variable that future TP was related to was follow-up self-reported fitness. This may suggest that people who had higher future TP at the beginning kept their future fitness goals in mind and were more dedicated to actually achieving them, resulting in a higher fitness score at the end of the six-week period. However, it is difficult to draw this conclusion when there was no relation between future TP and the variables motivation, ST costs, LT benefits, or exercise. In sum, more research is needed to understand the effects of people's perceptions of the benefits of exercise on their motivation to achieve these benefits.

General Discussion

The current research investigated reasons why some people are physically active while others choose to stay sedentary. Most people are aware of the numerous ST and LT health-related benefits one can achieve from regular exercise, yet there is a barrier between knowledge and action. Despite knowing about the positive outcomes and wanting to achieve them, people are constrained by the shorter-term costs. Hall and Fong (2001) found that inducing people to stay focused on the LT benefits of exercise by increasing their future TP caused them to exercise more. In this research, future time perception was examined as another variable that might affect how people view their future fitness goals and their likelihood of striving to achieve them. It was hypothesized

that if future, longer term outcomes of exercise feel temporally close, people would exercise more because they are more focused on the LT benefits. In contrast, if future benefits feel quite distant then people may be less motivated to work towards them, perhaps because ST barriers overshadow the LT benefits.

In three studies, we examined people's perceptions of future temporal distance, how they view the benefits of exercise, and their resulting motivation and exercise behaviour. Overall, there was little support found for our hypotheses that feeling subjectively close to the benefits of exercise leads people to stay focused on them, increases motivation to exercise, or increases exercise behaviour.

Study 1 found evidence that people who naturally feel close to the future report higher physical fitness, which could indicate that they are more focused on the consequences of their actions in the future, and thus engage in more behaviours such as exercise to improve their fitness levels. Notably, it was also found that those who ranked a ST benefit as most important reported the greatest amounts of exercise. This may be because the ST benefit on which they are focused is temporally close and thus more salient and motivating. This finding might suggest an alternate route by which some people remain motivated to exercise—rather than working to keep remote LT benefits in mind, they focus on more tangible ST benefits.

Study 2 failed to support the hypothesis that people who were induced to feel close to 30 years old would rank the benefits that they would achieve from exercise at this age as more important than would people who were induced to feel distant from 30 years old. Perhaps the importance people allot to ST and LT outcomes remains more steadfast than we thought, and the manipulation was not strong enough to affect people's opinions of how important different types of benefits are to them. We did find that people who

ranked ST or LT benefits as more important also tended to rate the passage highlighting their preferred benefits as more convincing, and this has implications for writing and dispersing health promotional materials. A possible implication of this finding is that different types of benefits ought to be highlighted and endorsed for a range of audiences, because of individual differences in the types of information that people find compelling.

One methodological issue that should be addressed in studies 1 and 2 is the benefit ranking task that participants completed. We asked participants to rank, rather than rate, the benefits in order of importance to them, to avoid possible ceiling effects; if we had asked them to *rate* the benefits it may be that some participants would rate all of the benefits very high and we would not be able to detect a difference in the importance of ST and LT goals. However, ranking a list of items may have been a relatively tedious process and some participants may have gotten bored with it quite quickly, causing them to complete the task without having put much thought into it. In both studies there were a number of people who completed the ranking incorrectly and were excluded from all analyses. If they were in fact getting bored with the task, the benefit ranking scores may not be an accurate measure of how much importance participants allot to ST and LT benefits and may have increased variability in the data. Another potential problem with ranking the benefits in order of importance is that it assumes equal spacing between each level of ranking. Therefore, this method is confounded and cannot detect relatively smaller or larger differences of importance from one level to the next and one's summed ranking score is not an accurate portrayal of how important they actually think the ST or LT benefits are.

Although Study 3 did not find strong effects of the time perception manipulation on exercise, motivation, or consideration of ST costs, there were significant differences in

exercise, motivation, and ST cost rating before and after participation in the study. Participants had higher levels of exercise and motivation and lower consideration of ST costs during participation in the study than they did at the beginning of the study. This suggests that simply being in the study was beneficial for the participants in terms of their exercise and motivation, regardless of what condition they were in. Hall and Fong (2001) found that having participants focus on the benefits of exercise that they will achieve in the future led them to increase their physical activity. Everyone in the present study was made cognizant of the benefits that they should achieve if they engage in regular exercise for 6 weeks. Therefore, it could be that everyone is receiving a type of future TP manipulation that induced them to focus on the benefits, and that this effect overrides any effect that the time perception manipulation may have had.

A more parsimonious interpretation for the finding that participants had higher motivation and exercise during the study than before may be that simply being a participant in the study helped to motivate participants over and above any induction to focus on the benefits. That is, recording their exercise behaviour, motivation, and ratings of costs and benefits caused them to feel more motivated and to exercise more. Having a control group who were not informed of the benefits of exercise at the beginning of the study but who did record the dependent measures would help to tease apart the effects of simply being in the study from the effects of being made cognizant of the future benefits.

Because there was no control group (who did not participate in the study) with whom to compare our participants, the time effects mentioned above could also have been a result of maturation or time of year. With the passage of time, maybe people are just naturally more motivated and increase their exercise levels more, especially towards the end of winter (the study was conducted during the month of March) when they might be

thinking about looking more fit for the summer months. However, the study was only 4 weeks long, and therefore it seems unlikely that maturation effects could play the primary role in such a short period of time. Time of year also seems unlikely to have strongly influenced exercise for two reasons. First, the weather was fairly poor for outdoor activity throughout the study, so participants would probably not be more inclined to go outdoors for exercise. Second, final exams were approaching within days of completing the study and if the time of year affected the students' exercise, it would probably be in the opposite direction because they were prioritizing studying.

The time perception manipulation in Study 3 appears to have effectively made participants feel subjectively closer to or further away from their 6 week future goals (when they should be experiencing the benefits of regular exercise). However, there was little evidence to suggest that participants who felt close to the 6-week fitness goal were exercising more, had greater motivation, or considered the LT benefits over the ST costs, and we propose a possible reason for this. Participants were informed at the beginning of the study that they should indeed experience a number of positive health outcomes if they exercised regularly for the next 6 weeks. Each day for the entire study, participants in the experimental conditions had a blurb displayed on the Palm Pilot to remind them of the positive effects of exercise, and then they skipped to the next screen to complete the time-line manipulation (choosing a box on the line to indicate where their 6-week goal would fall.) Feeling close to the future goal should only lead to greater motivation and exercise if at the time that they felt close, they were focused on the LT benefits associated with the six-week outcome. The intention of the time-line manipulation was to make the six-week benefits of exercise salient to participants at the same time they were induced to feel close. However, although we intended for participants to read about the benefits daily on

the Palm Pilots, many of them may have simply skipped to the next screen without reading it because they had read the same message several times previously. By ignoring the screen with the reminder of the benefits, the time perception manipulation may not have been effective, because both the benefits and feeling close to the six-week period were not active in their minds at the same time. One way to make both time perception and LT benefits salient simultaneously might be to have had a message after the manipulation screen to display where they had placed the line, asked that the person focus on it, and then reiterated in a brief message that with regular exercise, that is when they will achieve the benefits.

The time at which the manipulation was administered may not have been ideal for affecting people's motivation to exercise. For practicality, we combined the manipulation and DV components of each day's Palm Pilot experience into the same daily questionnaire session. Ideally, we would want to have the manipulation earlier in that day (before they exercise) and the DVs later in the day (to report how much they exercised after they finished). Most people probably completed the Palm questionnaire for the day after they had finished exercising for that day. This means that the time-line is administered after the exercise has occurred for the day and may not have the chance to have an immediate impact. Essentially what this means is that with the time-line, we might only influence the next day's exercise and its effects might well have worn off in large part by the time participants exercise the following day. Ideally, one might want them to complete the time-line right before they start thinking about exercising (or if they have a routine time of day that they exercise, complete it at that time of day) and then afterward, have a separate questionnaire to assess the exercise DVs.

Another possible reason that time perception did not increase participants' motivation or exercise in Study 3 may be because the benefits that participants were made mindful of were not chosen by themselves. Study 2 suggested that people are unwavering in what they deem to be important reasons for exercising; even though participants were induced to feel subjectively close to or distant from the LT benefits of exercise, this did not affect how important they ranked the ST and LT benefits. In Study 3, if people's beliefs and opinions as to why physical activity is important are stable, those participants who did not find the benefits that were endorsed in the study to be important to them may not have been motivated to achieve them regardless of how close or distant they perceived them to be. Participants indicated at the beginning of the study how much they believed that they would achieve the benefits that were described to them with regular physical activity and belief scores were checked as a potential moderator. We had thought that maybe only people who believed that they would achieve these benefits would be affected by the time perception manipulation, but people's beliefs did not moderate the effect that the time perception manipulation had on participants' exercise, motivation, or consideration of ST costs and LT benefits. Therefore, even though people actually thought that they could achieve the benefits, they were still not working harder to achieve them when they felt temporally close. Perhaps asking participants how much they wanted to achieve these benefits would have been a suitable additional measure of their initial motivation to achieve them. If someone believes he or she can achieve an outcome but also believes that the outcome is not important, he or she will likely not benefit from feeling subjectively closer to it. Similarly, if someone has a desirable outcome that he or she would like to achieve but does not believe that one can reach this goal, he or she may not be more motivated to achieve it when it feels close. Therefore,

having a measure of both beliefs and desirability of reaching the study's fitness goals may have allowed for more sensitive data analysis.

Another way we could have ensured that participants found the fitness goals addressed in the study to be desirable would be to have had them set their own goals, rather than imposing goals on them. Ideally, however, it would have been best to control for the benefits people were trying to achieve in the study. The optimal sample would include participants with very similar fitness goals (that could be reached within 6 weeks) who both desired to achieve them and believed they could achieve them in this time frame. Holding these variables (benefits, desirability, and beliefs) constant may have increased the power of the study to detect differences due to the time perception manipulation.

The time perception manipulation in Study 3 appears to have successfully altered people's perceptions of how subjectively close or distant a future point in time felt, and this finding is interesting in itself. Up to this point, only a few other studies manipulated how close or distant a future point in time felt, and these studies were temporary manipulations conducted in the lab (e.g., Lawford, Wilson and Buehler, 2002; Schmidt, 2003). In the current study, people's perceptions of how far 6 weeks felt were manipulated over the course of 4 weeks outside of the lab. This suggests that manipulating time perception more chronically may be worth investigating. For people who are sedentary, their health is especially jeopardized in the long-term (age 55 and above). If they are in their 20s and 30s, they may be less inclined to do anything about it, because they feel healthy now and 55 years old feels quite far away. If they are induced on a regular basis to feel that the long-term is temporally close, they may be more apt to make positive changes to their lifestyle to promote better health later in life.

Another way to possibly increase people's motivation and exercise behaviour is to have people focus on the ST benefits of exercise, as results from studies 1 and 2 would suggest. Study 2 showed that people naturally favoured ST over LT benefits, and studies 1 and 2 found a relation between favouring a ST benefit and greater levels of exercise. These findings were self-report and correlational, so we cannot determine a causal direction between exercising and preference for a ST benefit. However, it seems plausible that people who are focused on the ST exercise more because the positive outcome is immediate and therefore it may be beneficial to have people focus on the ST benefits such as increased energy and mental alertness, and feeling better about themselves. Perhaps sedentary people should be made cognizant of the ST benefits that they can achieve to get them motivated to start exercising. Once they start initially enjoying these immediate positive outcomes, they will be motivated to continually achieve them on a regular basis, and the LT benefits will be experienced in the future.

An aspect of this research that deserves mention is the novelty of the methodology (Study 3). Palm Pilots were lent to participants for the duration of the study so they could enter data every day for 4 weeks; research collecting data in real time this way is rare. Diaries are often used to collect data in real time, but they run the risk of participants filling in 7 entries before submitting the diary weekly, for example. The advantage of having the participants use Palm Pilots was that although they could fill in several entries at one time, we had an electronic record of the time and date of when participants completed the daily measures. Few participants actually completed the Palm Pilot questionnaire once a day for 28 days; most completed it almost once a day with several exceptions of 2 or 3 entries in one day, and a few completed the questionnaires sporadically (e.g., 7 entries in one day, once per week). Many times, participants would

neglect to complete the questionnaire on days that they did not exercise, so this would not affect the accuracy of reporting exercise behaviour. Failing to complete the Palm Pilot questionnaire every day is especially problematic for the experimental conditions, because this means that they are not receiving the experimental manipulation daily. If the participants had been more responsible in filling out the Palm Pilot questionnaire daily, the manipulation may have had a stronger effect on them. Despite the fact that the participants did not comply with the Palm Pilot methods perfectly, using this methodology probably greatly improved accuracy of reporting compared to other real-time data collection such as diary entries.

People's personal views on exercise and fitness may be less malleable and more chronic than we had thought. The subtle manipulation of distance does not have much effect on people's motivation to exercise. One possible future research direction in this area it to investigate more aggressive manipulations of people's perceptions of the benefits of exercise, such as chronically changing people's perspectives on health behaviour, making them more focused on the future and to have them consider the consequences of their actions more seriously. Perhaps if participants were reminded of the benefits of exercise and induced to feel subjectively close to them over a longer period of time, such as several months, they would feel more motivated to exercise because the benefits feel salient and more important.

Earlier I had discussed Construal Level Theory (CLT) as a possible mechanism by which feeling subjectively close to the benefits of exercise may affect motivation to exercise. That is, perhaps if the benefits feel close, they also are more tangible and concrete, whereas benefits that feel distant tend to be more abstract. In future research, it may be interesting to actually measure participants' construal of the benefits of exercise.

Maybe people who feel far from the benefits of exercise would construe them more abstractly (e.g., I could be more fit, I could have more energy), whereas people who feel close to the benefits would construe them more concretely (e.g., I could play soccer longer with my friends, I could feel more energized for my 8:30am class). Examining people's construals of their perceptions of the benefits of exercise, and how it relates to time perception, may help to determine the role of this factor in people's motivation to be physically active.

There has been little research done in the past in the area of the construction of time, how people perceive the benefits of exercise, and exercise behaviour. Hall and Fong (2001) induced a future TP in participants, causing them to focus on the positive outcomes of staying physically active. The manipulation in Study 3 was more subtle than what had been used in the past, as it was hypothesized that time perception—or feeling subjectively close to the future—would be sufficient to make these benefits feel more salient and tangible to participants. Although our hypothesis was not supported, Study 3 serves as a starting point for future research in this area. The time-line time perception manipulation appears to have succeeded to induce people to feel close to a future point in time. More research is needed to help determine the effects of time perception on people's motivation to achieve the benefits of exercise. Perhaps by making more explicit connections between feeling close to a future point in time and the benefits that they will achieve at that time, there will be a stronger effect of time perception on people's motivation and exercise.

As with many studies conducted in a natural setting, there was a lot of noise in the data and variability among participants that we could not control for. Perhaps also a more

controlled setting where participants have similar lifestyles and routines could be examined in the future, such as a classroom, workplace, or group home.

There is plenty of anecdotal evidence that attests that although many people are aware of the benefits of exercising and the importance of leading a healthful, active lifestyle, they pay no heed to the advice of their doctors, media, or their personal knowledge, and they remain sedentary. More research is needed to help clarify the barriers that exist between knowledge and action, and to help people lead longer, more healthful lives.

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Footnotes

[1] In the current study, LT benefits include those that are reaped later in life such as reducing risk of chronic illnesses and living longer. Medium-term (MT) benefits are those that are achieved after several weeks, such as improved flexibility. For the sake of clarity, both MT and LT benefits were grouped "LT benefits" level, because neither is achieved immediately like ST benefits are. ST benefits can be achieved during or immediately after exercise and include increased energy and having fun.

[2]Analyses were also conducted using the full range of scores of ST minus LT and revealed the pattern of findings, although the fitness effect became marginal.

[3]Time perception was analysed as an independent variable by calculating a median split. The researchers opted to report the results of ANOVA analyses using a dichotomous split rather than multiple regression analyses (using a continuous variable) for ease of reporting. A multiple regression was also performed, and revealed the same pattern of results.

[4]An adapted version of the full TP measure was used, which excluded questions pertaining to a past TP. The experimenters were interested in the effects of a future versus present-oriented TP and therefore only these items were used.

[5]The researchers decided to include the TP inventory and SE scale in the questionnaire after having already run a few research sessions, so only 58 of the 73 participants in Study 2 completed these two measures.

[6]Because the LT benefit ranking score has a -1.00 correlation with the ST benefit ranking score, the LT results were identical but in the opposite direction, and therefore not reported.

Appendix A

Study 1

Health and Exercise Questionnaire- Page 1

Background Information: Age: _____ Sex: _____

Please read the questions carefully and answer each one honestly. Check YES or NO.

Yes	No	
___	___	1. Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?
___	___	2. Do you feel pain in your chest when you do physical activity?
___	___	3. In the past month, have you had chest pain when you were not doing physical activity?
___	___	4. Do you lose your balance because of dizziness or do you ever lose consciousness?
___	___	5. Do you have a bone or joint problem that could be made worse by a change in your physical activity?
___	___	6. Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition.
___	___	7. Do you know of any other reason why you should not do physical activity?

On average, how many ***hours*** have you spent ***in the past 4 weeks*** doing the following types of physical activities? (Indicate the number of hours in the space provided.)

_____ Vigorous aerobic exercise such as running, cycling, swimming, playing basketball & group fitness classes.

_____ Moderate and light aerobic exercise such as brisk walking, light jogging, karate, and playing volleyball.

_____ Other forms of physical activity or exercise (please specify) _____

In your opinion, how physically fit are you, currently?

1	2	3	4	5	6	7	8	9	10
Not fit at all									Extremely fit

Health and Exercise Questionnaire- Page 2

Please **rank order** the following benefits of exercise from 1 to 10 in order of importance *to you.* Write the numbers 1 through 10 beside each statement where 1 **is the *most* important** and **10 is the *least* important**.

_____ Weight loss or weight management
_____ Increased energy
_____ Strengthening your heart and lungs
_____ Increased flexibility
_____ Reducing stress
_____ Avoiding disability later in life
_____ Recreation (for fun)
_____ Feel better about yourself
_____ Reducing risk of chronic illnesses
_____ Longer lifespan

If a benefit of exercise that is important to you is not listed above, please indicate it below:

_____

Please take a moment to think about your expected future level of fitness. Think about how physically fit you reasonably expect to be in one year.

1 2 3 4 5 6 7 8 9 10
Not fit at all Extremely fit

Sometimes future points in time tend to ***feel*** closer or further away, regardless of how far in the future they will actually occur. Think about yourself one year from now. On the scale below, please indicate how close or far away that point in time ***feels*** to you now.

1 2 3 4 5 6 7 8 9 10
Feels very close Feels very distant

Appendix B
Study 2

Background Information:

Age: _____
Gender (circle one): F M
Year in university (circle one): 1 2 3 4 (or above)

Please read the following passage:

Being physically active is beneficial to your overall health. Various studies have shown that exercising at a moderate to high intensity on a regular basis (for 30 minutes a day, at least 4 days/week) will result in several positive effects.

Some of the positive effects of exercise will happen in a relatively short period of time—from the first time you exercise to several weeks after exercising on a regular basis. Many people feel invigorated with increased energy in their daily lives when they are physically active. People who exercise regularly report less mental stress than people who don't exercise regularly. Physical activity can help to reduce one's body fat if it is too high, or maintain your body composition. In addition, exercise contributes to psychological health, including decreased depression and anxiety, and improved overall sense of well-being.

If you continue to exercise on a regular basis from now up to your 30's, you can reap a number of the following long-term benefits of exercise when you are 30 years old, as well. Studies have shown that physical activity reduces the risk of developing type II (adult-onset) diabetes. It will also help to reduce the chance of developing high blood pressure—a symptom of heart disease—or to decrease high blood pressure if it already exists. Research has found a strong link between being physically active and reducing the chances of developing certain types of cancer, such as colon and breast cancers. Finally, exercising now and into your early 30's will help to build and maintain healthy muscles, bones, and joints, which will help you function better on a daily basis, and reduce the risk of injury to these areas.

In order to visualize the benefits of exercise when you are 30 years old, (as stated above) it may be useful to place that age on a time line. Simply place a slash through the time line below indicating approximately where 30 years old is, for you.

(65 years old)
Today **35 years old**
|_____|

Please rank order the following benefits of exercise from 1 to 8 in order of importance *to you*. Write the numbers 1 through 8 beside each statement where **1 is the *most* important** and **8 is the *least* important.**

_____ Reduce or maintain body weight or body fat
_____ Increase energy
_____ Reduce the risk of developing diabetes
_____ Reduce stress

_____ Reduce high blood pressure or the risk of developing high blood pressure
_____ Improve psychological well-being
_____ Build and maintain healthy muscles, bones, and joints
_____ Reduce the risk of developing colon cancer or breast cancer

How motivated do you feel to exercise, now at your current age? (Circle a number)

1	2	3	4	5	6	7	8	9	10
Not motivated at all									Extremely motivated

Approximately how many hours **per week**, on average, do you intend to exercise from now until the end of the school term (mid-April)? Exercise includes activities done at a moderate or high level of intensity, including (but not limited to): jogging, brisk walking, swimming, karate, weight-lifting, hiking, and group fitness classes. (Please check one)

_____	_____	_____	_____	_____
0 hrs/week	0-1.9 hrs/week	2-3.9 hrs/week	4-5.9 hrs/week	6 or more hrs/week

We are interested in the effectiveness of different types of health communications for convincing people of the benefits of exercise.
Please read the following 2 passages and rate each of them for how effective you thought each of them are at emphasizing the importance of exercise:

Passage 1

It is important to integrate physical activity into your daily life. Exercising on a regular basis (3-4 times/week) has a host of benefits associated with it, many of which you will begin to experience in a short period of time. Being physically active gives you more energy to carry out the activities of your daily routine. It reduces tension and stress, and allows you to sleep better at night. Being active stimulates and improves concentration, which can help to enhance your focus at school and work. Physical activity can help you to lose weight and keep you at a body weight that is right for you. In addition, exercise makes you feel better mentally, with greater self confidence, decreased depression and anxiety, and improved overall sense of well-being.

1	2	3	4	5	6	7	8	9	10
Not effective at all									Very effective

Passage 2

It is important to integrate physical activity into your daily life. Exercising on a regular basis (3-4 times/week) has a host of benefits associated with it that will improve your health and quality of life several years down the road. Physical activity can reduce your risk of developing type 2 (adult onset) diabetes. Exercise will improve your circulation, help to lower your blood pressure and decrease "bad" (LDL) cholesterol. If you are physically active you will reduce the chances of developing certain types of cancer, such as colon and breast cancers. Regular exercise will help to build and maintain

healthy muscles, bones, and joints, which will help you to function better on a daily basis, and reduce the risk of injury to these areas in the long-term.

1	2	3	4	5	6	7	8	9	10
Not effective at all									Very effective

Sometimes future points in time tend to ***feel*** closer or further away, regardless of how far in the future they will actually occur. Think about yourself at 30 years old. On the scale below, please circle a number that indicates how close or far away that point in time ***feels*** to you now.

1	2	3	4	5	6	7	8	9	10
Feels very close									Feels very distant

In your opinion, how physically fit are you, **currently**? (Circle a number)

1	2	3	4	5	6	7	8	9	10
Not fit at all									Extremely fit

Please take a moment to think about your expected future level of fitness. Think about how physically fit you expect to be **in one year**. (Circle a number)

1	2	3	4	5	6	7	8	9	10
Not fit at all									Extremely Fit

Think about yourself one year from now. On the scale below, please indicate how close or far away that point in time ***feels*** to you now.

1	2	3	4	5	6	7	8	9	10
Feels very close									Feels very distant

Approximately how many hours **per week**, on average, have you exercised since the *beginning* of the school term (i.e., since January)? Exercise includes activities done at a moderate or high level of intensity, such as jogging, brisk walking, swimming, karate, weight-lifting, hiking, and group fitness classes. (Please check one.)

_____ 0 hrs/week

_____ 0-1.9 hrs/week

_____ 2-3.9 hrs/week

_____ 4-5.9 hrs/week

_____ 6 or more hrs/week

Approximately how many hours have you exercised in total, **in the past 2 weeks**?

_____

Please read each of the following items and, as honestly as you can, answer the question: "How characteristic or true is this of you?"
Indicate a number in the space provided, using the following scale:

1	2	3	4	5
very uncharacteristic	**uncharacteristic**	**neutral**	**characteristic**	**very characteristic**

_____1. I believe that getting together with one's friends to party is one of life's important pleasures.
_____2. Fate determines much in my life.
_____3. My decisions are mostly influenced by people and things around me.
_____4. I believe that a person's day should be planned ahead each morning.
_____5. I do things impulsively.
_____6. If things don't get done on time, I don't worry about it.
_____7. When I want to achieve something, I set goals and consider specific means for reaching those goals.
_____8. When listening to my favourite music, I often lose all track of time.
_____9. Meeting tomorrow's deadlines and doing other necessary work comes before tonight's play.
_____10. Since whatever will be will be, it doesn't really matter what I do.
_____11. I try to live my life as fully as possible.
_____12. It upsets me to be late for appointments.
_____13. Ideally, I would live each day as if it were my last.
_____14. I meet my obligations to friends and authorities on time.
_____15. I make decisions on the spur of the moment.
_____16. I take each day as it is rather than try to plan it out.
_____17. It is important to put excitement in my life.
_____18. I feel that it's more important to enjoy what you're doing than to get work done on time.
_____19. Before making a decision, I weigh the costs against the benefits.
_____20. Taking risks keeps my life from becoming boring.
_____21. It is more important for me to enjoy life's journey than to focus only on the destination.
_____22. Things rarely work out as I expected.
_____23. It takes joy out of the process and flow of my activities if I have to think about goals, outcomes, and products.
_____24. You can't really plan for the future because things change so much.
_____25. My life path is controlled by forces I cannot influence.
_____26. It doesn't make sense to worry about the future, since there is nothing that I can do about it anyway.
_____27. I complete projects on time by making steady progress.
_____28. I take risks to put excitement in my life.
_____29. I make lists of things to do.
_____30. I often follow my heart more than my head.
_____31. I am able to resist temptations when I know that there is work to be done.
_____32. I find myself getting swept up in the excitement of the moment.

_____33. Life today is too complicated; I would prefer the simpler life of the past.
_____34. I prefer friends who are spontaneous rather than predictable.
_____35. I keep working at difficult, uninteresting tasks if they will help me get ahead.
_____36. Spending what I earn on pleasure today is better than saving for tomorrow's security.
_____37. Often luck pays off better than hard work.
_____38. I like my close relationships to be passionate.
_____39. There will always be time to catch up on my work.

To help us understand your experiences a bit better, please complete the following personality and attitude questionnaire.

1	2	3	4	5	6	7	8	9
strongly disagree		somewhat disagree		neither agree nor disagree		somewhat agree		strongly agree

_____ On the whole I am satisfied with myself.

_____ At times I think I am no good at all.

_____ I feel that I have a number of good qualities.

_____ I am able to do things as well as most other people.

_____ I feel I do not have much to be proud of.

_____ I certainly feel useless at times.

_____ I feel that I'm a person of worth, at least on an equal plane with others.

_____ I wish I could have more respect for myself.

_____ All in all I am inclined to feel that I am a failure.

_____ I take a positive attitude toward myself.

Sometimes research participants have certain ideas about what the research is about, or what the investigators are examining. If you had any suspicions about the purpose of the study while you were completing the questionnaire, please briefly explain them below.

_____

_____

_____

_____

Appendix C
Study 3

COMPONENTS OF A WORK-OUT

1. WARM-UP

Regardless of age and fitness level, everyone needs a proper warm up before beginning the more strenuous component of their workout. A good warm-up is essential to workout success for a number of reasons including the following:

- Gradual increase in muscle temperature reduces the chance of injury to muscles and joints.
- Warming up the body prevents the early onset of fatigue by allowing the body time to gear up and deliver more oxygen to your muscles.
- A warm-up reduces the stress on your cardiovascular system by making a gradual transition from rest to exercise. Overall physical performance is enhanced.
- It gives you a chance to gauge how you're feeling that day, and any aches/pains that you should be weary of during your exercise that day.
- It allows you to prepare mentally for your workout by refocusing your mind away from daily stress and into the upcoming workout.

An effective warm up:

- Should last at least 3-5 minutes (a few minutes longer if you are a beginner)
- Should increase your heart rate and breathing rate gradually
- Uses continuous rhythmic motions

Some ideas for a 5 minute warm-up:

- Stationary cycling at a light pace
- Easy rowing on the rowing machine
- Easy pace on an elliptical trainer or stair climber
- Brisk walking or light jogging
- Walking up and down stairs

When you have completed your warm up, you should be warm, breathing a bit harder (but not gasping for air) and feel energized and limber.

2. CARDIOVASCULAR EXERCISE

How much exercise should I be doing?

- If you are currently inactive (a beginner), start with about 15 minutes of cardio exercise at a time, and gradually increase exercise time by about 5 minutes each week.
- If you are currently physically active, you may exercise between 30 to 60 minutes as desired.
- Your exercise intensity will depend on your current fitness level and how you're feeling that day.
- How often you decide to exercise depends on you. If you feel adequately rested between workouts and you want to exercise everyday, then it may be okay to do so. But it is important to listen to your body and take rest days when you need them. In order to experience the positive benefits of exercise, you should be exercising at least 3 days/week.

Some ideas for cardiovascular exercise:

- Brisk walking or jogging
- Stationary cycling
- Swimming
- Water aerobics
- Fitness classes
- Stairmaster
- Elliptical trainer
- Rowing machine
- Sports that require continuous movement (e.g., basketball, squash)

Some safety tips for cardio exercise:

- For these activities, begin with light exercise and progress to more vigorous activities later if you like. (This will prevent or minimize any muscle soreness you might experience when you are starting out.)
- Use comfortable footwear that provides good cushioning and support.
- Wear comfortable clothing that suits your activity—and the weather!
- Wear safety gear approved by the Canadian Standards Association (CSA) whenever appropriate (e.g., a helmet for cycling and in-line skating, protective eye goggles for squash).

3. CARDIOVASCULAR RECOVERY (cool-down)

At the end of your cardio workout, you should gradually reduce the intensity level of the exercise before stopping. It is important to include the recovery phase because your body has pushed blood to all the exercising muscles and it needs a cool-down period to redistribute the blood to all parts of the body. If you were to stop the activity abruptly, it would be hard on your cardiovascular system and could leave you feeling tired and stiff. Just like the warm up, the cardiovascular recovery gives a gradual reduction in exercise intensity, reduces the chance of injury, and leaves you feeling energized.

- Cool down for approximately 5 minutes by reducing the intensity of your exercise until your breathing and heart rate are almost back to normal.

4. STRETCHING

Once the workout is complete, there is a need for relaxation, rejuvenation, and muscle recovery. After exercise is an excellent time to do flexibility training because your muscles are warm and pliable and therefore more able to stretch to a new range of motion.

Flexibility training (stretching):

- Helps to reduce stress in the exercising muscles and release the tension developed in the workout.
- Assists in good posture, and proper posture minimizes stress on your joints and maximizes your strength.
- Reduces the risk of injury during exercise and daily activities.

- Enhances performance of everyday activities

Some stretching guidelines:

- You should stretch for at least 5-10 minutes at the end of your workout.
- Pay specific attention to the muscles that you worked that day. For example, if you used the rowing machine, you should stretch your upper body more than if you used the stationary bike.
- Hold each stretch for 20-30 seconds.
- Don't overdo it—you should be able to feel a stretch in the muscle (mild discomfort), but it should not be painful.
- Hold the stretch still—no bouncing!

STRETCHES

Lower body:

- **Quadricep stretch (front of your thigh)-** standing straight on one leg, use your hand to hold one heel to your buttocks, keeping your knees together.
- **Seated gluteus stretch (buttocks)-** seated, extend both legs in front, cross one leg over the other, foot flat on the floor, turn toward your bent leg and look behind you.
- **Modified Hurdler stretch (hamstring-back of thigh)-** seated, extend both legs in front, bend one leg so the bottom of your foot is positioned at the inner thigh of your other leg, bend forward towards your extended leg.
- **Calf stretch (back of lower leg)-** facing a wall, put both hands flat against the wall at shoulder height, place one foot approx. 2 ft. in front of the other, toes pointing forward, front leg bent, back leg straight, push the heel of your back leg to the floor
- **Adductor (inner thigh) stretch-** standing with toes pointing forward, feet a little more than hip width apart, lunge to one side

Upper body:

- **Arm across body (shoulder) stretch-** bring one arm across your body, use your other arm to gently pull it across your chest
- **Cat (lower back) stretch-** down on your hands and knees, round your back and neck
- **Tricep stretch (back of arm)**- reach one arm up, bend it so your hand is reaching between your shoulder blades, use your other arm to gently push down on your elbow
- **Upper back stretch-** reach both hands forward at chest height and clasp your hands together, rounding your upper back
- **Chest stretch-** reach both hands behind your back and clasp them together at your lower back, pulling your shoulders back

PAIN AND INJURIES

It is normal to feel slight discomfort in your muscles for a day or 2 after exercising, especially if you haven't been active in a while. However, if at any time you feel pain (such as a joint pain, pulled muscle, torn ligament) or any other symptom that could

compromise your health, you should stop exercising and seek advice from a medical doctor or physiotherapist.

Athletic Complex (AC) Hours of Operation:

Monday-Thursday: 7am-midnight
Friday: 7am-9pm
Saturday: 9am-6pm
Sunday: 10am-midnight

Appendix D

Please carefully read the following questions and circle the number that corresponds with your answer.

1. On average, over the past week, how energetic do you feel?

Very Sluggish/ Tired						Very Energetic/ Active
1	2	3	4	5	6	7

2. On average, over the past week, how much mental stress do you feel?

Extremely Relaxed						Extremely Stressed
1	2	3	4	5	6	7

3. How flexible do you feel when you stretch during/after exercise, and moving throughout the day?

Not flexible at all						Extremely Flexible
1	2	3	4	5	6	7

4. After exerting yourself for a short period (e.g., running to class, climbing a flight of stairs), how winded do you feel?

Not winded at all						Extremely Winded
1	2	3	4	5	6	7

5. Over the past week, how mentally alert do you feel?

Extremely Dull						Extremely Alert
1	2	3	4	5	6	7

Appendix E

As you were told when you came in today, there are a number of benefits of being physically active. It is well documented that many people begin to experience these benefits after about 6 weeks of regular exercise.

Please read the following statements and write the number that corresponds to how much you agree or disagree with each statement, using the following scale:

Strongly Disagree			Neither Agree nor Disagree			Strongly Agree
1	2	3	4	5	6	7

"If I exercise regularly for the next 6 weeks…

1. _____ I will be mentally sharper."

2. _____ I will feel more energetic."

3. _____ I will be more flexible, and be able to stretch my muscles longer than I can now."

4. _____ I will have stronger heart and lungs, and feel less winded when I walk fast or run."

5. _____ overall, I will feel healthier."

Appendix F

Please rate the following 10 reasons for exercising or not exercising to indicate how important each one was for influencing your decisions to exercise (or not exercise) over the past week. Write a number beside each reason, using the following scale:

1	2	3	4	5	6	7
Not at all Important			Somewhat Important			Extremely Important

____ I'm too tired

____ It takes too much work

____ I'd rather do something else

____ I'm too busy

____ It's an inconvenience

____ Other reason not to exercise (please specify_____)

____ Increased energy

____ Reduced stress

____ Improved flexibility

____ Stronger cardiovascular system

____ Improved mental alertness

____ Other reason to exercise (please specify_____)

Appendix G

Please place a number beside each of the following statements to indicate how much you agree or disagree with the statement.

Strongly Disagree			Neither Agree nor Disagree			Strongly Agree
1	2	3	4	5	6	7

_____ 1. Over the past week, I have had difficulty getting motivated to exercise.

_____ 2. I've had a strong desire to be physically active over the past week.

_____ 3. I have had no problems getting motivated to exercise this week.

_____ 4. Over the past week, I generally preferred to do things other than exercise.

_____ 5. Being physically active was a priority for me this week.

Appendix H

Sometimes future points in time tend to ***feel*** closer or further away, regardless of how far in the future they will actually occur. At the beginning of this study, you were informed of the benefits that you should experience after 6 weeks of regular exercise

Simply place a slash through the line below to indicate how close or far away **6 (5, 4, 3, 2) weeks from today** *feels* to you now.

Feels very close

Feels very distant

Appendix I

After about 6 weeks of regular exercise, you will experience a number of positive benefits. Indicating this target date on a time-line will help you to place your 6 week goal in visual perspective. On the next page, please indicate the approximate location of this target date on the time line.

Choose a box on the line where your six week goal would fall.

Today (April 30) Graduation

Today I exercised for:
1- less than 10 min.
2- 10 to 14 min.
3- 15 to 19 min.
4- 20-29 min.
5- 30-39 min.
6- 40-49 min.
7- 50 min. or more

What kind of exercise did you do most today?
1- jogging or brisk walking
2- cardio machine
3- swimming
4- cycling (bicycle)
5- sport
6- some other activity

Using the following scale, how intense was your exercise today?

1 Extremely light
2 Very light
3 Light
4 Somewhat hard
5 Hard (heavy)
6 Very Hard
7 Extremely Hard

Please read the following statements and choose the number that corresponds to how much you agree or disagree with each statement, using the following scale:

Strongly Disagree			Neither Agree nor Disagree			Strongly Agree
1	2	3	4	5	6	7

1. Today, exercise made me feel cheerful.

2. After today's exercise sessions, I felt bad about myself.

3. Today, exercise made me feel energized.

4. During exercise today, my muscles hurt.

5. Overall, I enjoyed exercising this today.

Appendix J

For how many minutes did you exercise this week? _____

What kind of exercise did you do most?
_____ jogging or brisk walking
_____ cardio machine
_____ swimming
_____ cycling (bicycle)
_____ sport or other activity

On average, how intense were your exercise sessions this week? _____

1 Extremely light
2 Very light
3 Light
4 Somewhat hard
5 Hard (heavy)
6 Very Hard
7 Extremely Hard

Please read the following statements and write the number that corresponds to how much you agree or disagree with each statement, using the following scale:

Strongly Disagree			Neither Agree nor Disagree			Strongly Agree
1	2	3	4	5	6	7

1. _____ This week, exercise made me feel cheerful.

2. _____ After this week's exercise sessions, I felt bad about myself.

3. _____ This week, exercise made me feel energized.

4. _____ During exercise this week, my muscles hurt.

5. _____ Overall, I enjoyed exercising this week.

Appendix K

Sometimes past points in time tend to ***feel*** closer or further away, regardless of how far in the past they actually occurred. Think back to the **beginning of the study, 4 weeks ago**.

Simply place a slash through the line below to indicate how close or far away the beginning of the study ***feels*** to you now.

Feels like yesterday

Feels like a long time ago

Appendix L

Think back to the beginning of this study when you completed the following fitness questionnaire. Please try to recall the responses that you gave to this questionnaire <u>4 weeks ago, at the beginning of the study.</u>

1. On average, over the past week, how energetic do you feel?

Very Sluggish/ Tired						Very Energetic/ Active
1	2	3	4	5	6	7

2. On average, over the past week, how much mental stress do you feel?

Extremely Relaxed						Extremely Stressed
1	2	3	4	5	6	7

3. How flexible do you feel when you stretch during/after exercise, and moving throughout the day?

Not flexible at all						Extremely Flexible
1	2	3	4	5	6	7

4. After exerting yourself for a short period (e.g., running to class, climbing a flight of stairs), how winded do you feel?

Not winded at all						Extremely Winded
1	2	3	4	5	6	7

5. Over the past week, how mentally alert do you feel?

Extremely Dull						Extremely Alert
1	2	3	4	5	6	7

Figure Captions

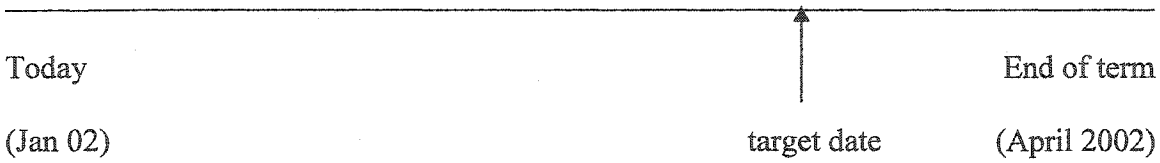
Figure 1. Time-line manipulation used in previous research.

Figure 2. Aggregate rating over 4 weeks of how close the 6-week score feels by condition, controlling for baseline measure.

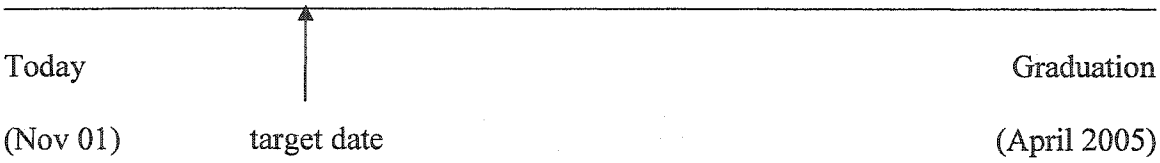
Figure 3. Amount of exercise aggregated over 4 weeks by condition, controlling for baseline fitness scores.

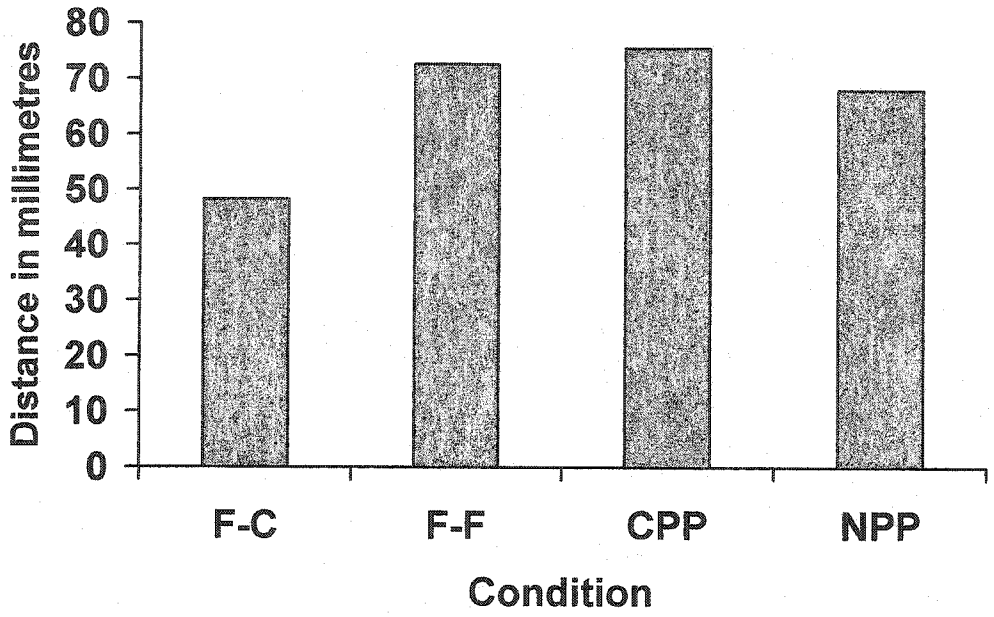
Figure 4. Amount of exercise each week by condition, controlling for baseline fitness scores.

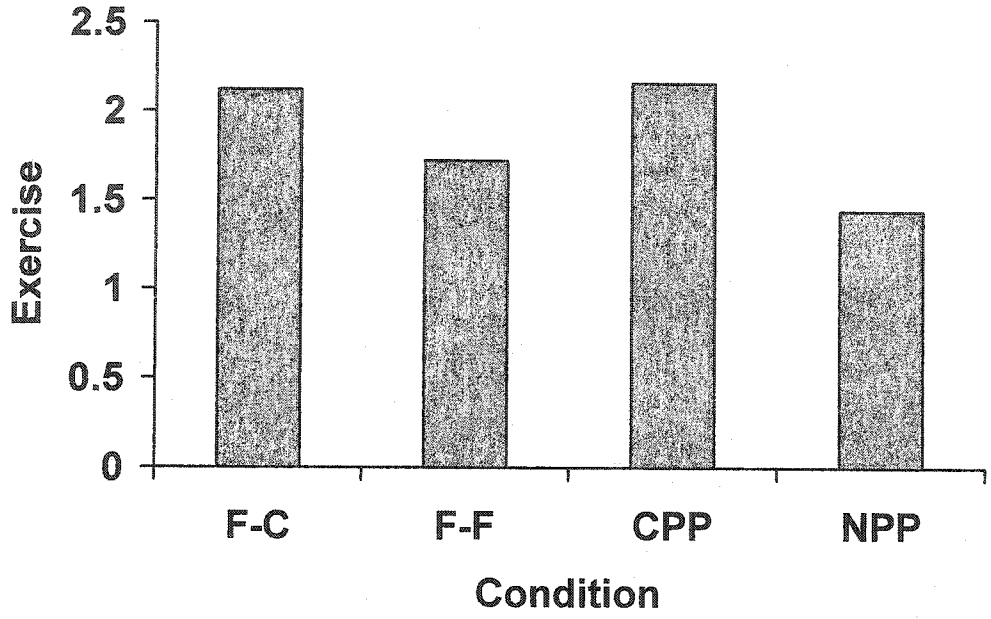
Future Self Feels Distant

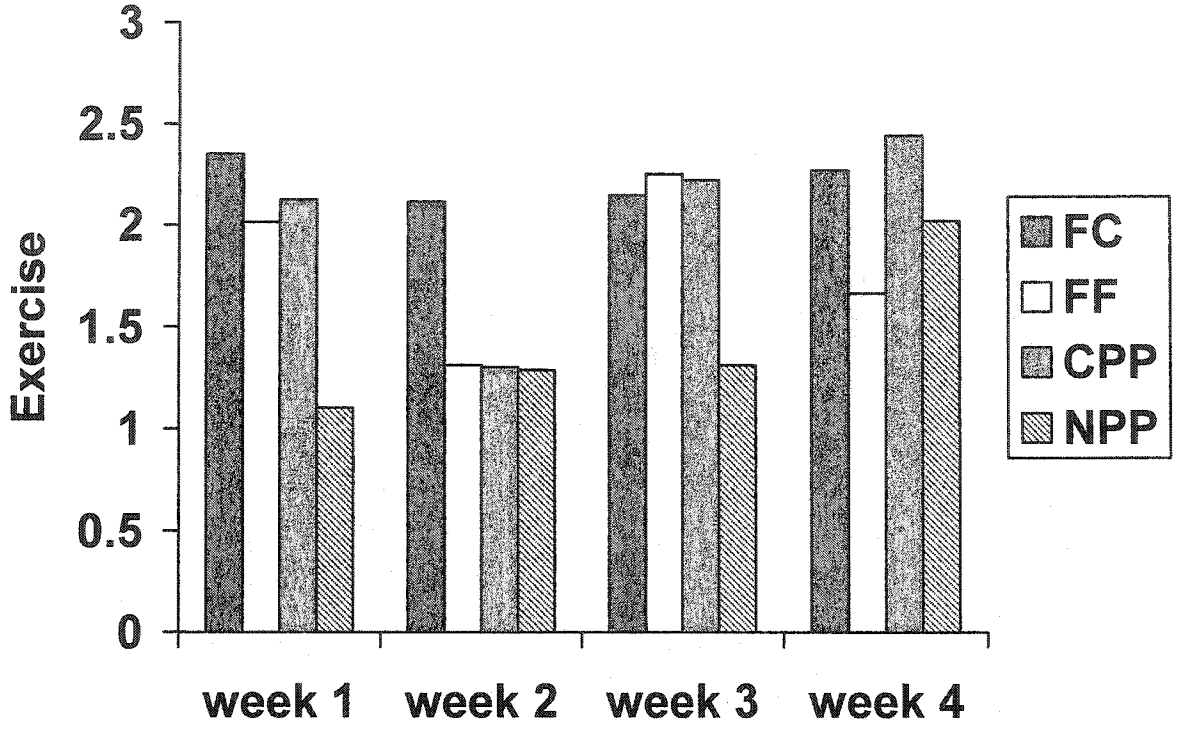


Future Self Feels Close




Distance in millimetres
80
70
60
50
40
30
20
10
0
F-C
F-F
CPP
NPP
Condition


2.5
2
1.5
1
0.5
0
Exercise
F-C
F-F
CPP
NPP
Condition


Exercise
3
2.5
2
1.5
1
0.5
0
week 1
week 2
week 3
week 4
FC
FF
CPP
NPP